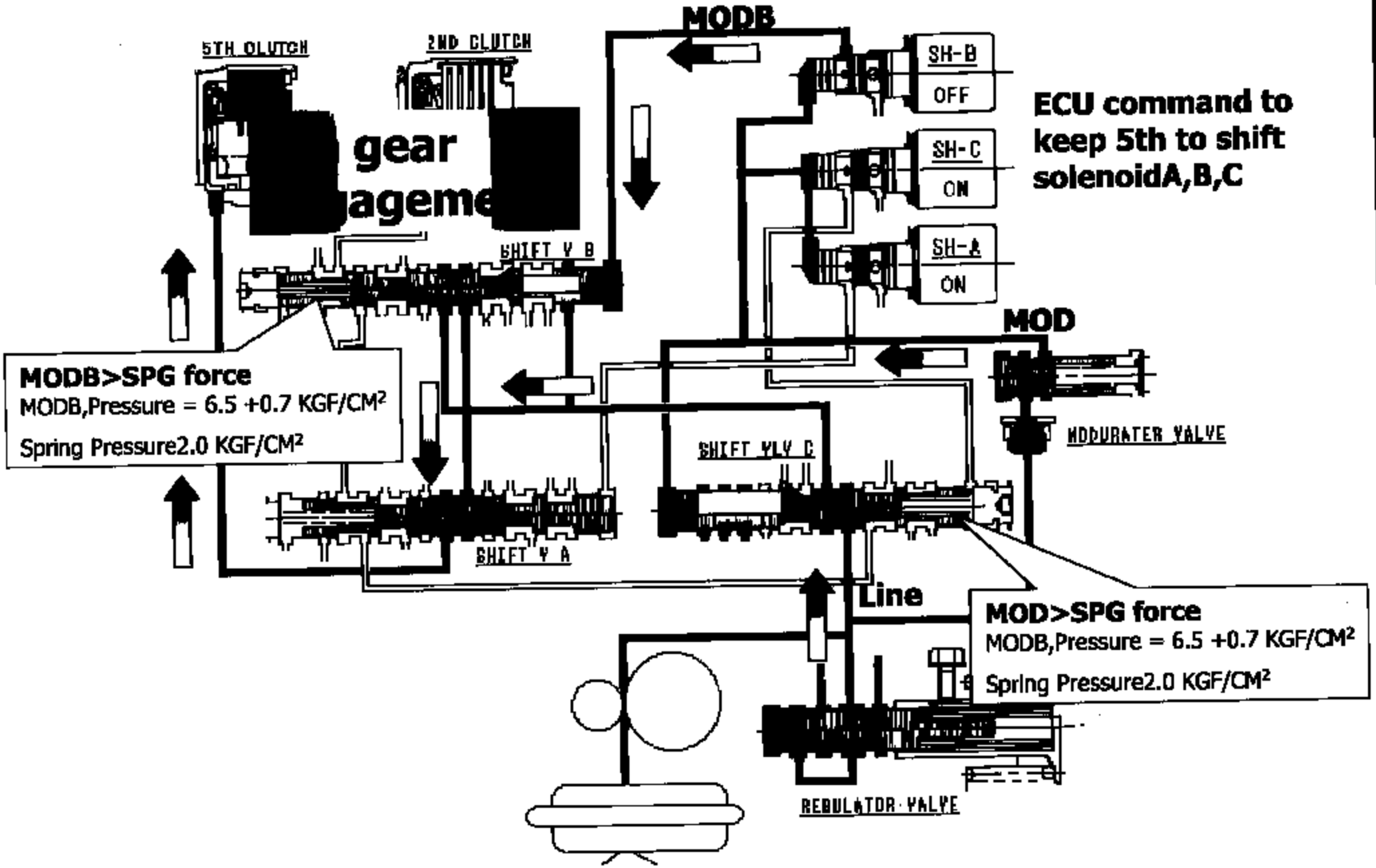
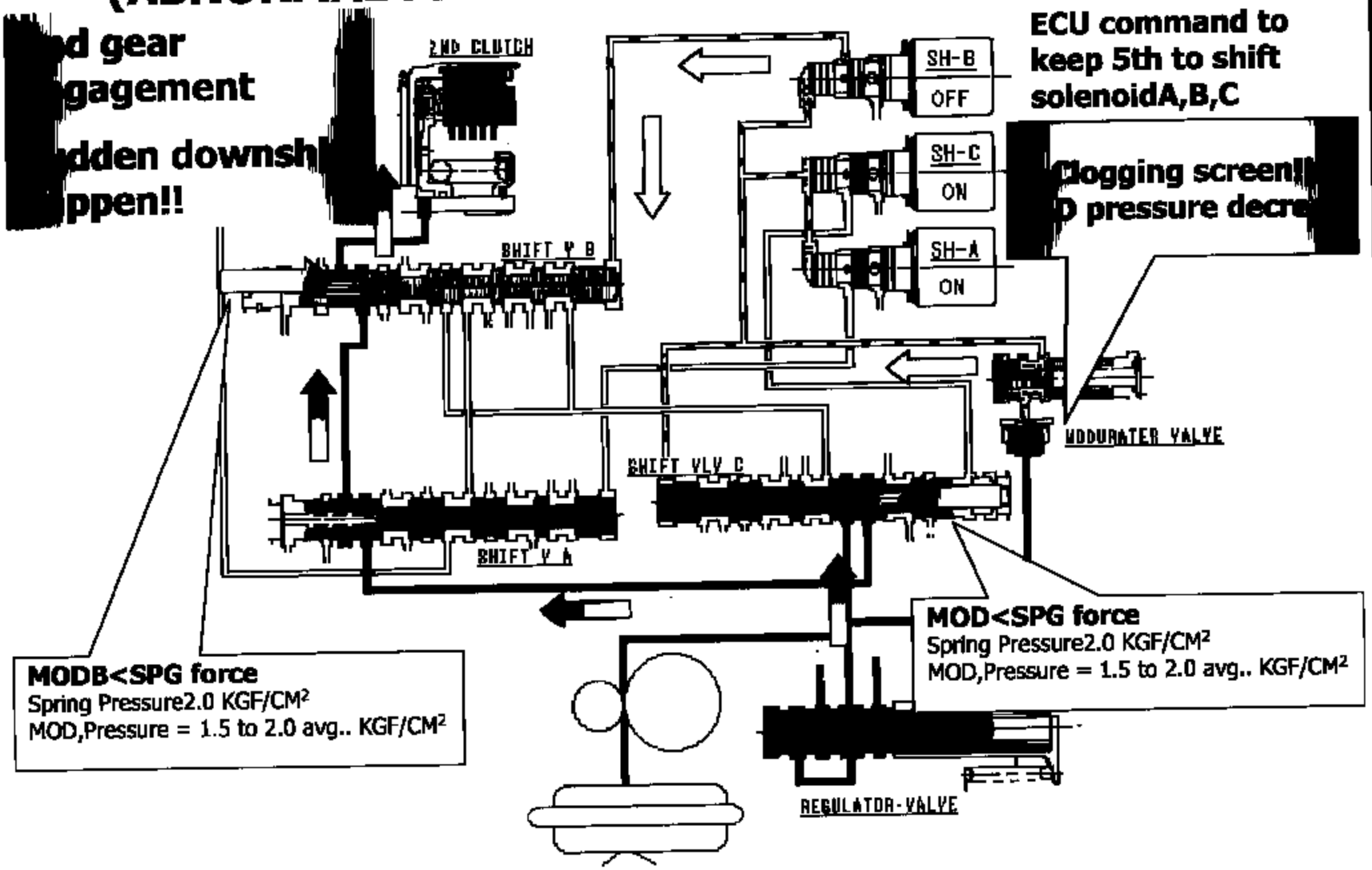
Sudden downshift mechanism

5 TH CLUTCH ENGAGEMENT HYDRAULIC CIRCUIT (NORMAL PRESSURE)

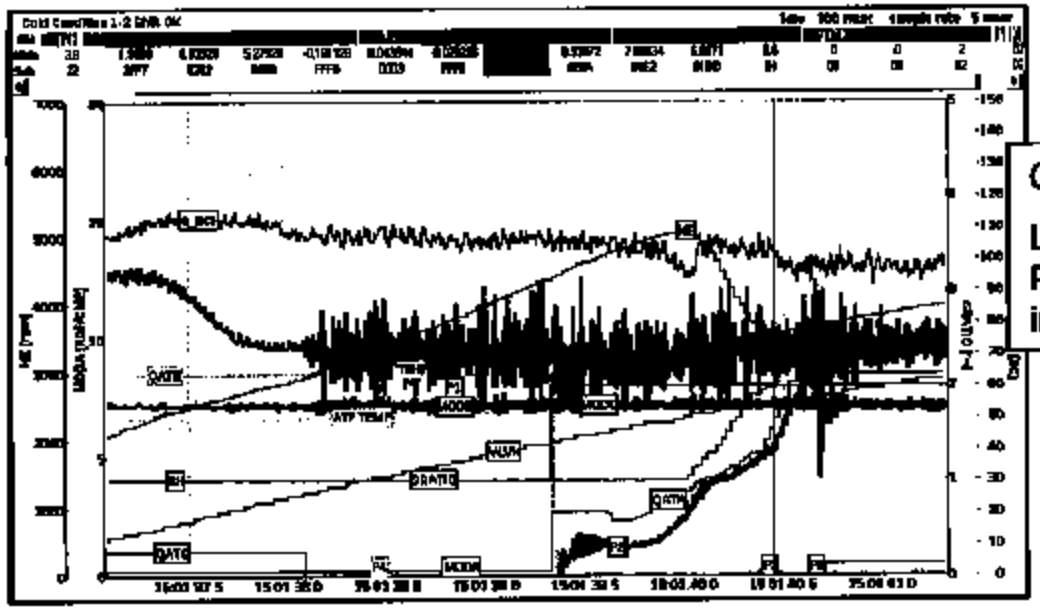


2ND CLUTCH ENGAGEMENT HYD. CIRCUIT (ABNORMAL PRESSURE AT SUDDEN DOWNSHIFT)



NHTSA Sudden Down Shift Investigation
BGFA-1018720 Low Temperature

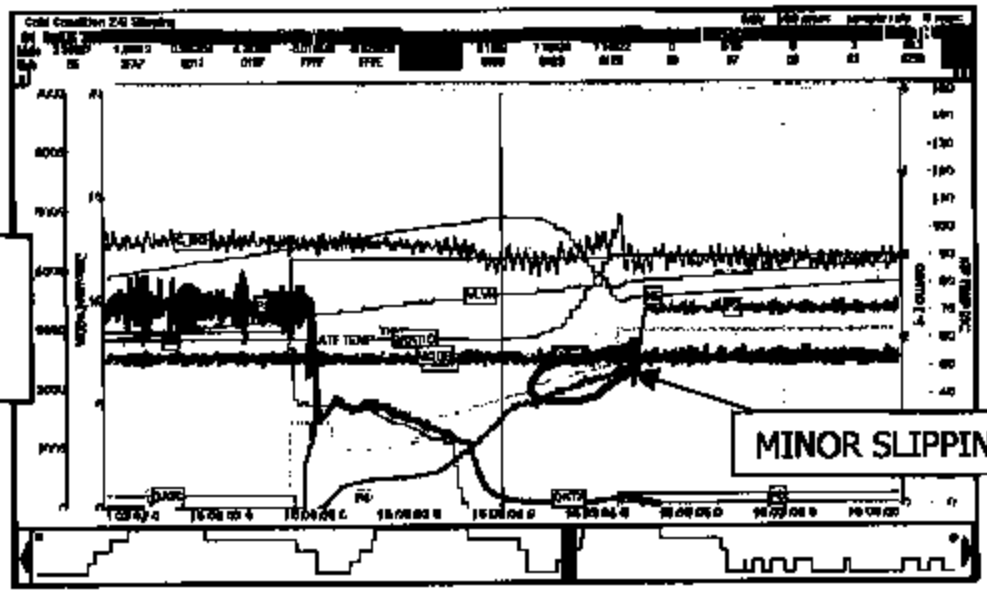
BGFA-1018720 1-2 Shift Cold Condition (53C)



CONCLUSION:

Line Pressure, 1st Clutch and 2nd Clutch Pressure are Ok. (The cause of fluctuations in line pressure is due to noise.)

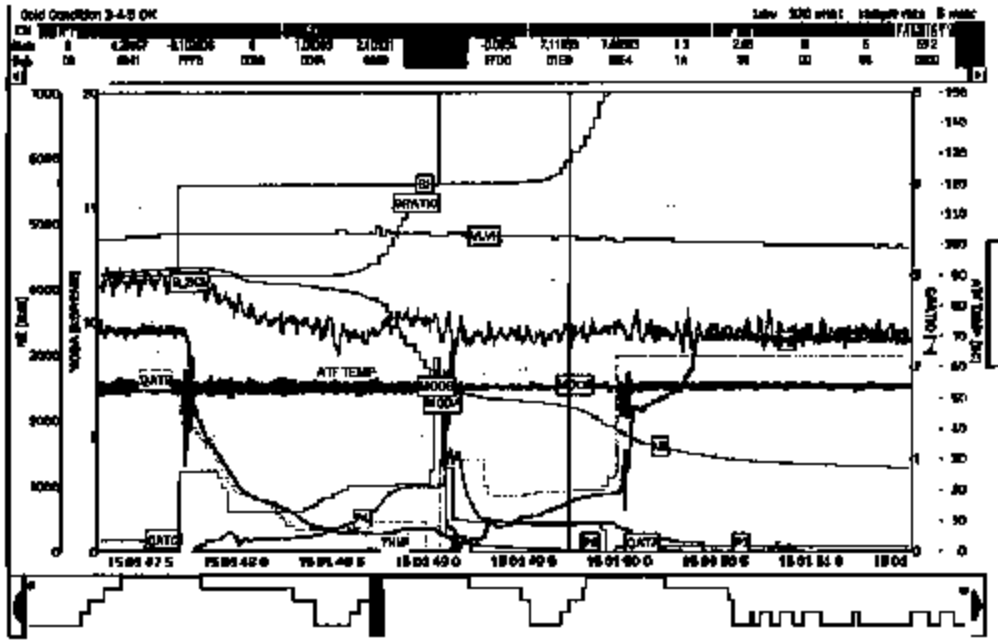
BGFA-1018720 2-3 Shift Cold Condition (60C)



CONCLUSION:

Minor slipping found in 3rd Gear on 2-3 up shift.

BGFA-1018720 2-3 Shift Cold Condition (59C)

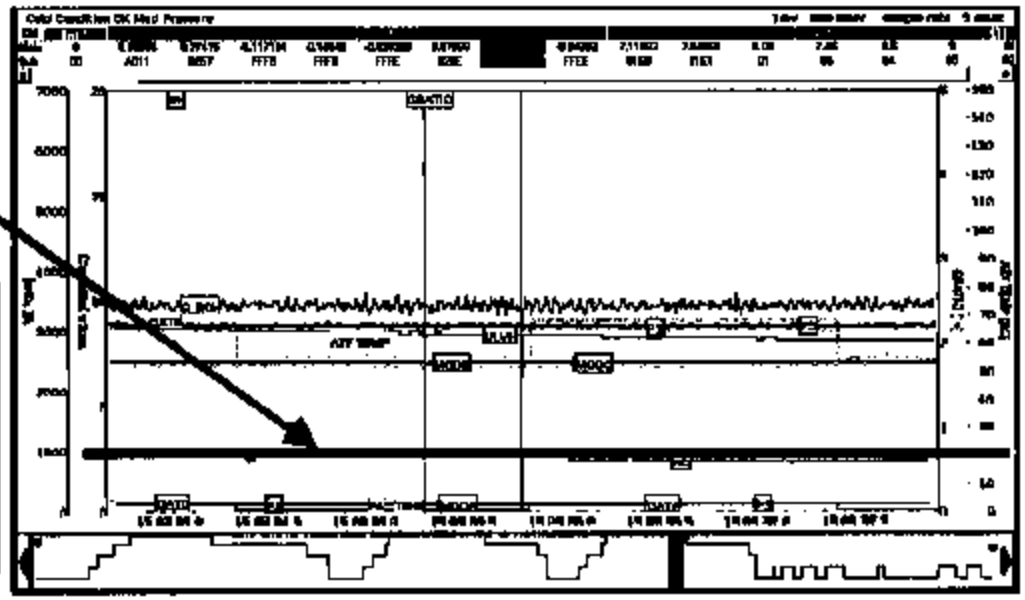


CONCLUSION:

3-4-5 shift ok, pressures ok.

BGFA-1018720 5th cruse Cold Condition (TH off , 60C)

MOD Pressure Failure Point;
Where mod pressure is overcome by shift valve C spring pressure.



CONCLUSION:

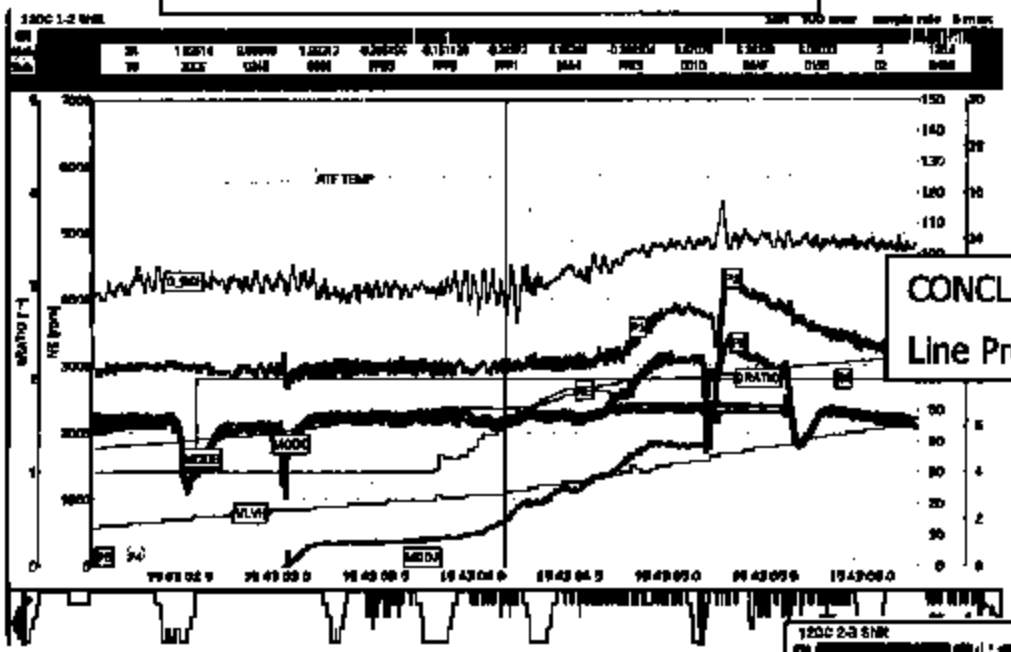
Sudden down shift didn't happen.
Modulator pressure did not fall below (2 KGF/Cm^2).
So sudden down shift is not a possibility on this transmission. Modulator pressure was below normal but able to overcome spring pressure.

In-Vehicle Confirmation Test - Detail Results

Cond. / ATM #	Cold ATF				Hot ATF				Warming Lights			
	1->2	2->3	3->4	4->5	1->2	2->3	3->4	4->5				
BGFA-1018818												
BGFA-1028385												
BGFA-1018720												
B7WA-8014113												
B7WA-8025514												
B7WA-9059518												
M7WA-1038579												
B7WA-5009644												
B7WA-9045810												

NHTSA Sudden Down Shift Investigation
BGFA-1018720 +120 C

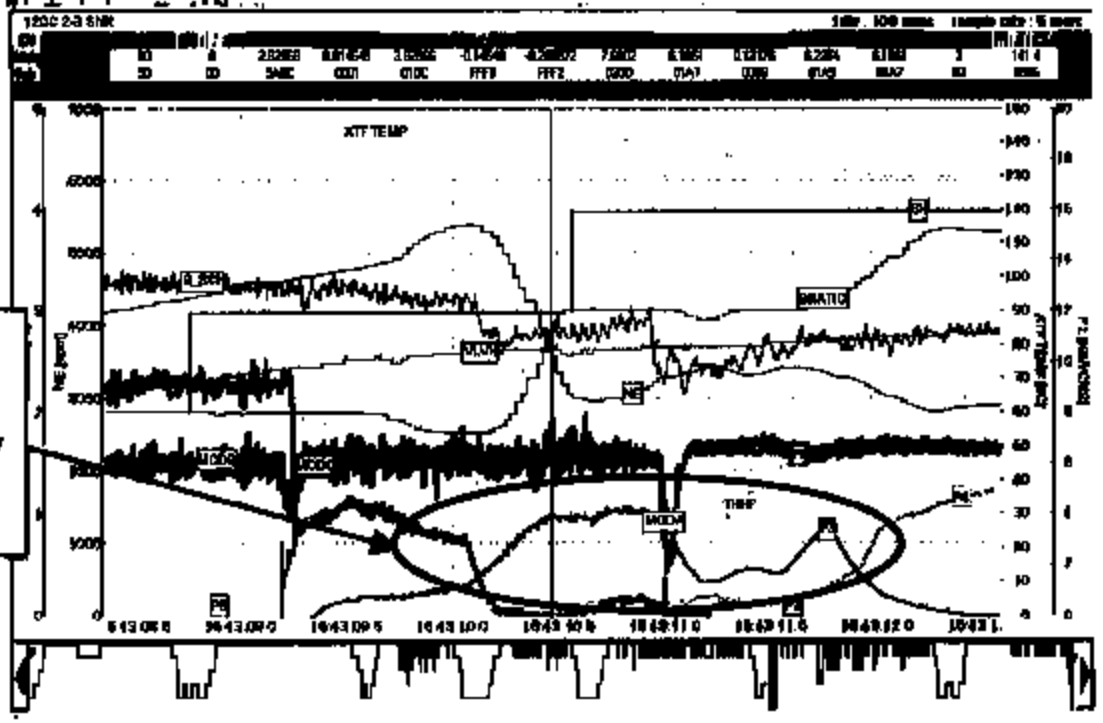
BGFA-1018720 1-2 ABOVE 120 C



CONCLUSION:

Line Pressure, 1st Clutch and 2nd Clutch Pressure are Ok.

BGFA-1018720 2-3 ABOVE 120 C

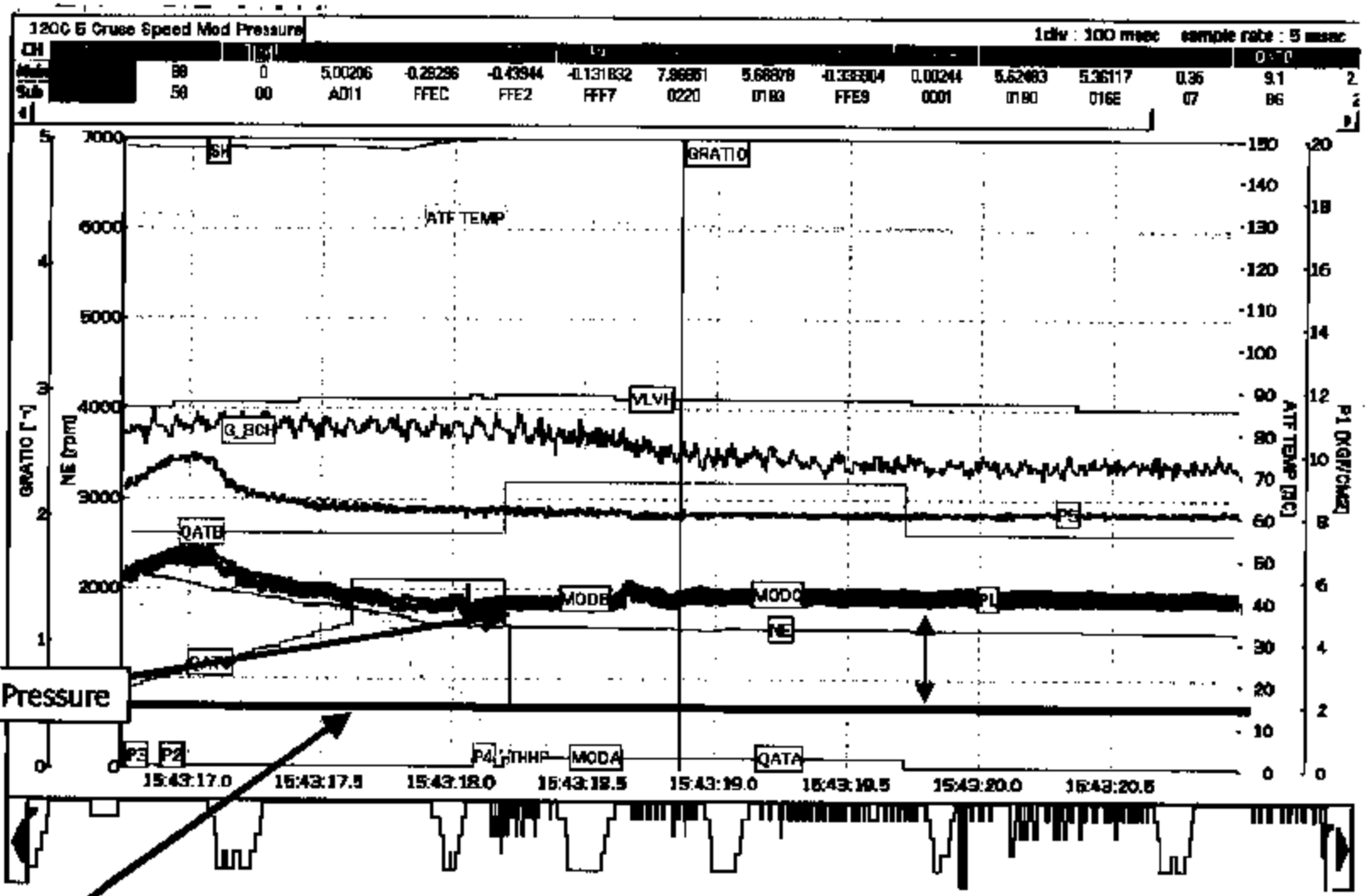


CONCLUSION:

During 2-3 Up Shift major slipping occurred on 3rd Clutch. After inability to engage 3rd completely 4th clutch was engaged.

BGFA-101[illegible]20 1-2 ABOVE 120 C

+ 120 °C



Actual Mod Pressure

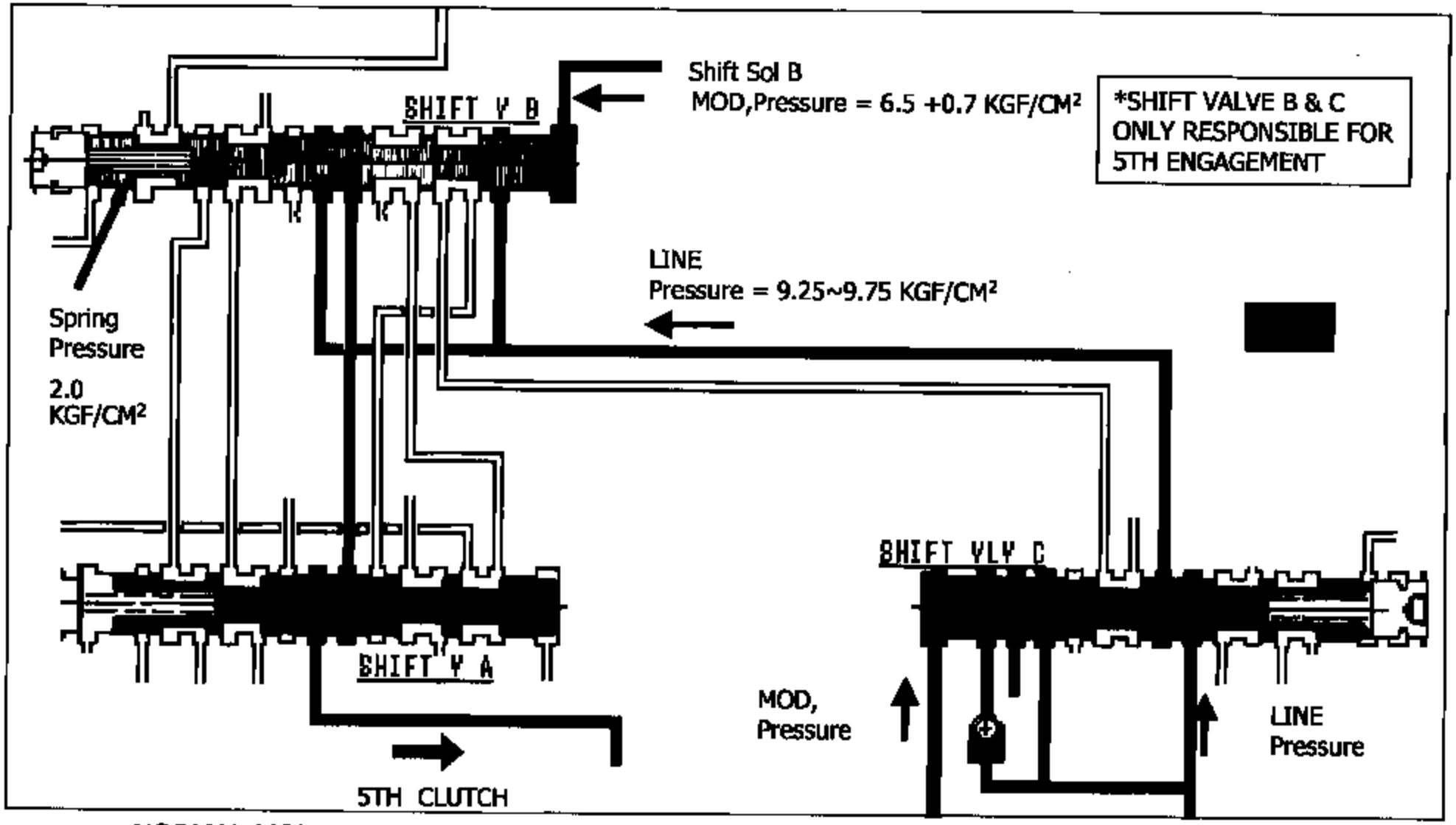
MOD Pressure Failure Point; Where mod pressure is overcome by shift valve C spring pressure.

CONCLUSION:

Sudden down shift didn't happen.
Modulator pressure did not fall below (2 KGF/Cm^2). So sudden down shift is not a possibility on this transmission.
Modulator pressure was below normal but able to overcome spring pressure.

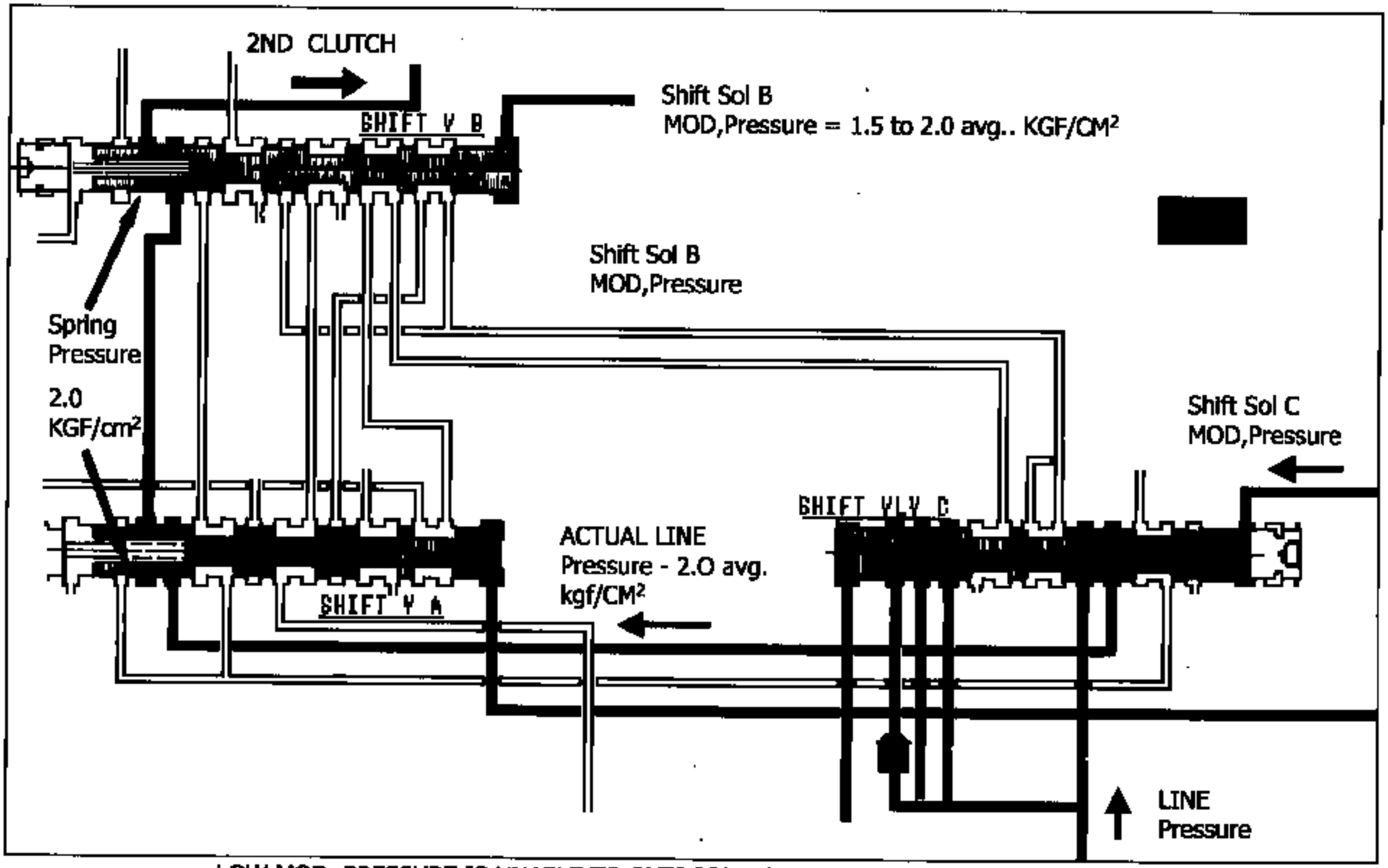
5 TH CLUTCH ENGAGEMENT

HYDRAULIC CIRCUIT (NORMAL PRESSURE)



NORMAL MOD. PRESSURE IS ABLE TO OVERCOME SPRING PRESSURE WHICH PERMITS 5TH GEAR ENGAGEMENT AND HOLD ABOVE 45MPH.

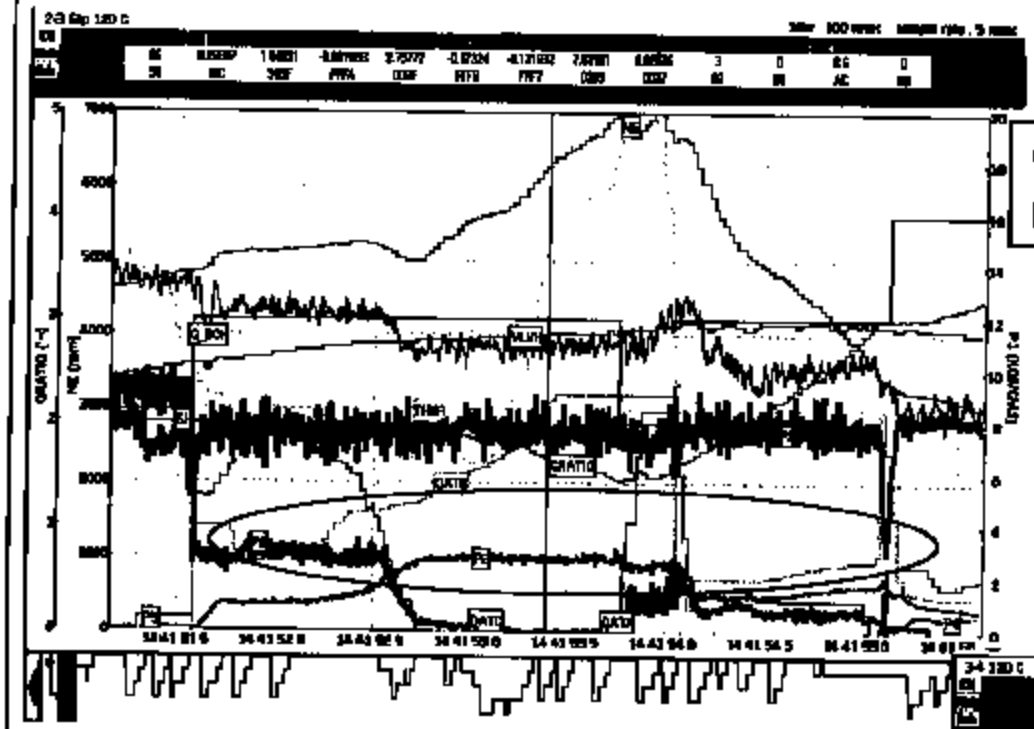
2ND CLUTCH ENGAGEMENT HYD. CIRCUIT (ABNORMAL PRESSURE AT SUDDEN DOWNSHIFT)



LOW MOD. PRESSURE IS UNABLE TO OVERCOME SPRING PRESSURE THEREFORE MISSION ENGAGES SECOND GEAR. THROTTLE OFF WILL DROP MOD. PRESSURE BELOW SPRING PRESSURE DUE TO CLOGGED FILTER SCREEN.

BGFA-1018818 Sudden Down Shift Investigation
Mission above 120 °

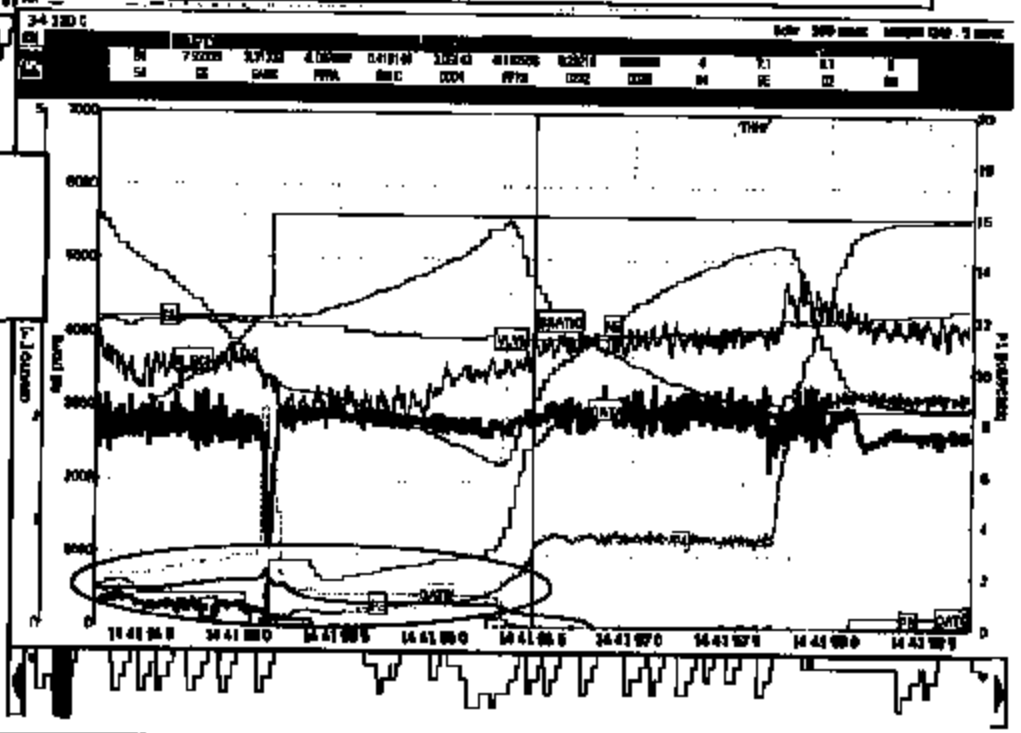
BGFA-1018818, High Temperature Mode



CONCLUSION:

Major slipping was noticed on 2-3 Up Shift.

BGFA-1018818, High Temperature Mode



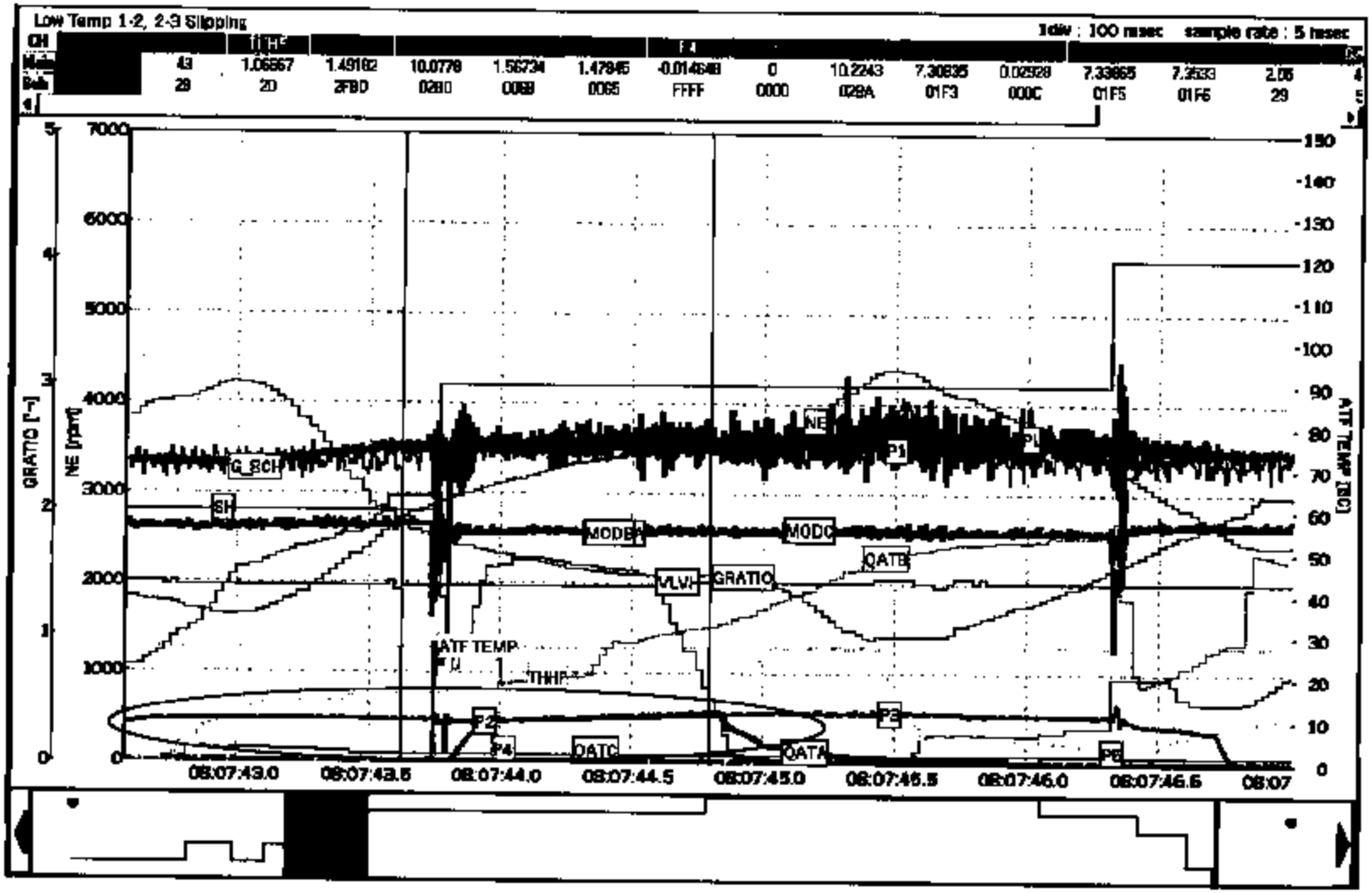
CONCLUSION:

No engagement In 3rd, resulted in a direct engagement to 4th.

Low clutch pressure is due to screen clogging, causing decrease in supply pressure from pressure sharing to other clutches.

BGFA-1018818 Sudden Down Shift Investigation
Low Temperature Mode

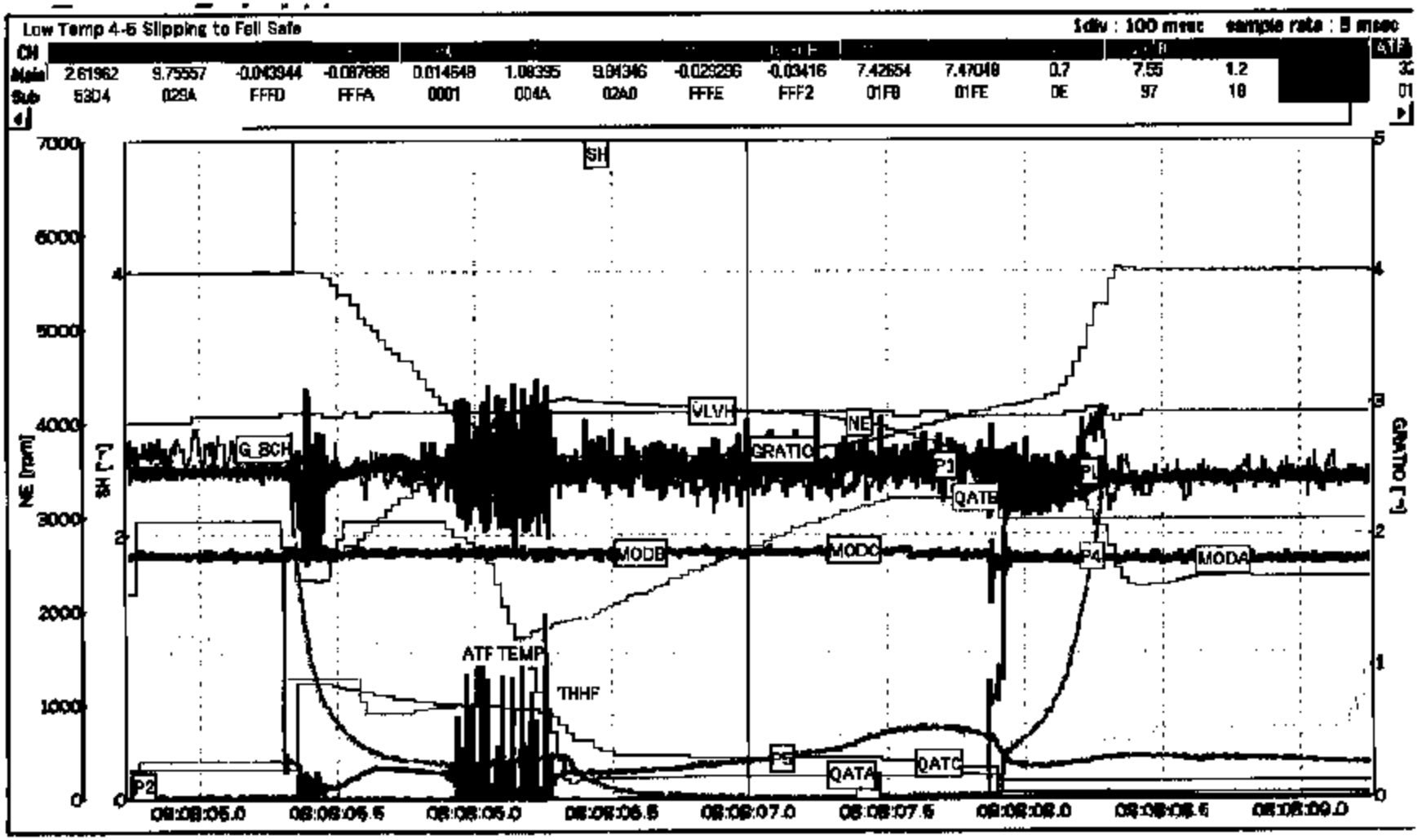
BGFA-1018818, Low Temperature Mode



CONCLUSION:

Major slipping occurred In 2-3 up shift on both 2nd and 3rd clutches.

BGFA-1018818, Low Temperature Mode

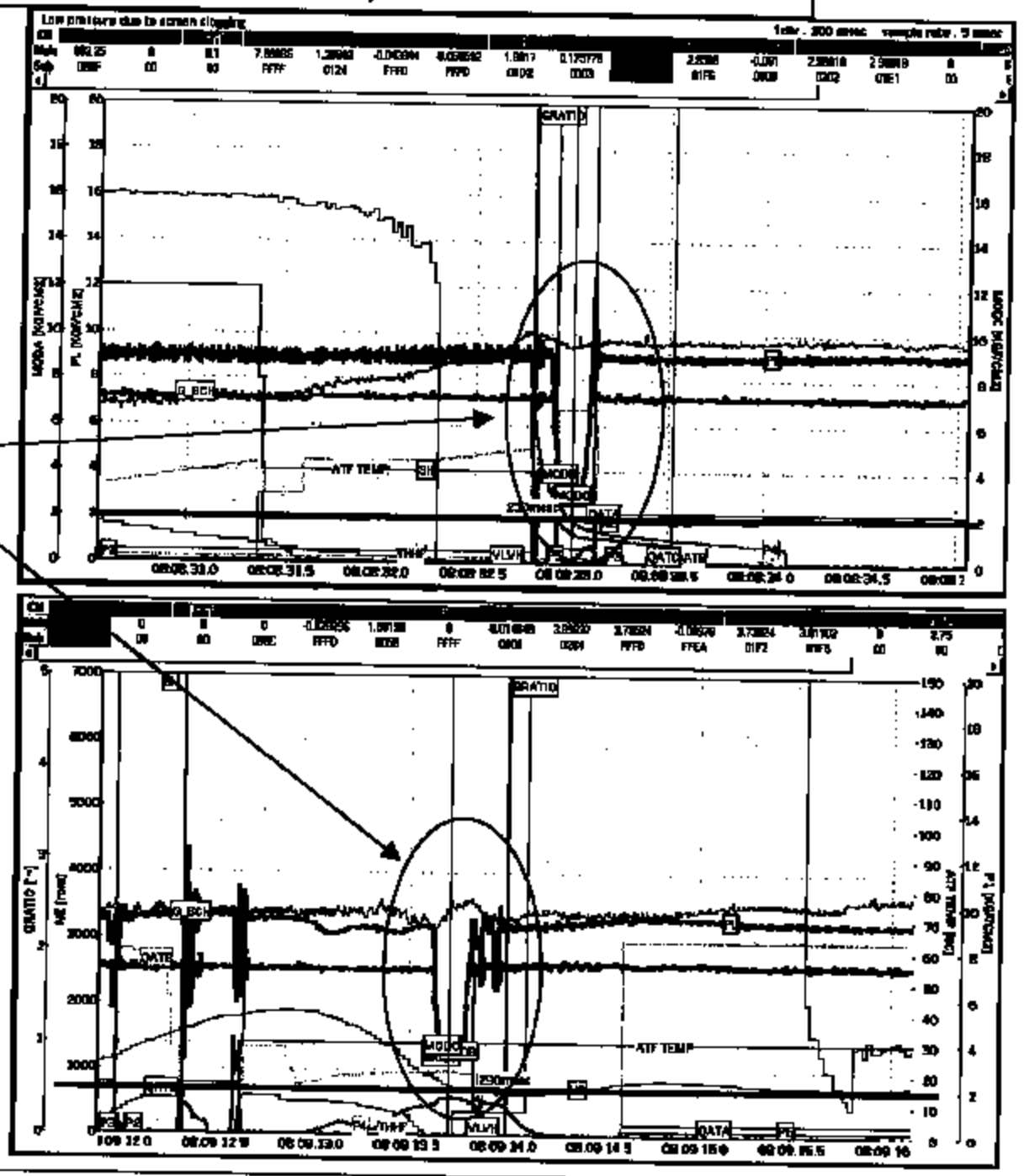


Conclusion:

During 4-5 shift major slipping occurred. ECU records shift time and G ratio, if abnormal shift time occurs and gear is not detected mission will shift to fail safe mode.

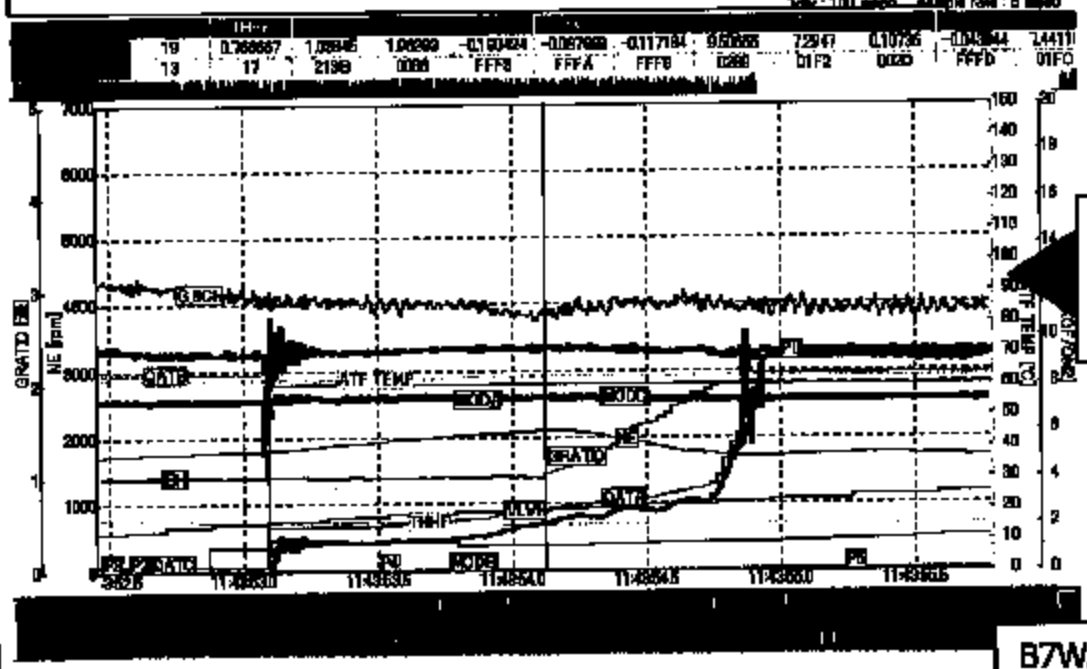
BGFA-1018818, Low Temperature Mode

Drop in total mission pressure due to screen clogging. Sudden Down shift didn't occur because Mod pressure was still above 2Kgf/Cm²



B7WA-8014113 Sudden Down Shift Investigation
Low Temperature Mode

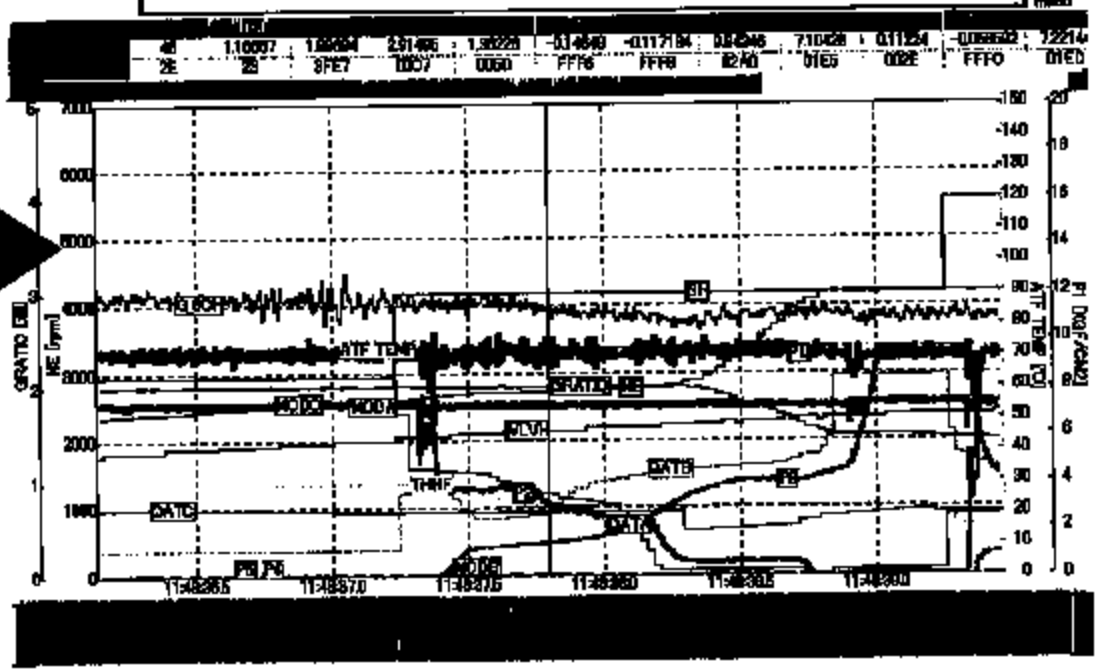
B7WA-8014113 1-2 Shift Cold Condition (TH1/8 , 64C)



CONCLUSION:

Line Pressure, 1st Clutch and 2nd Clutch Pressure are Ok.

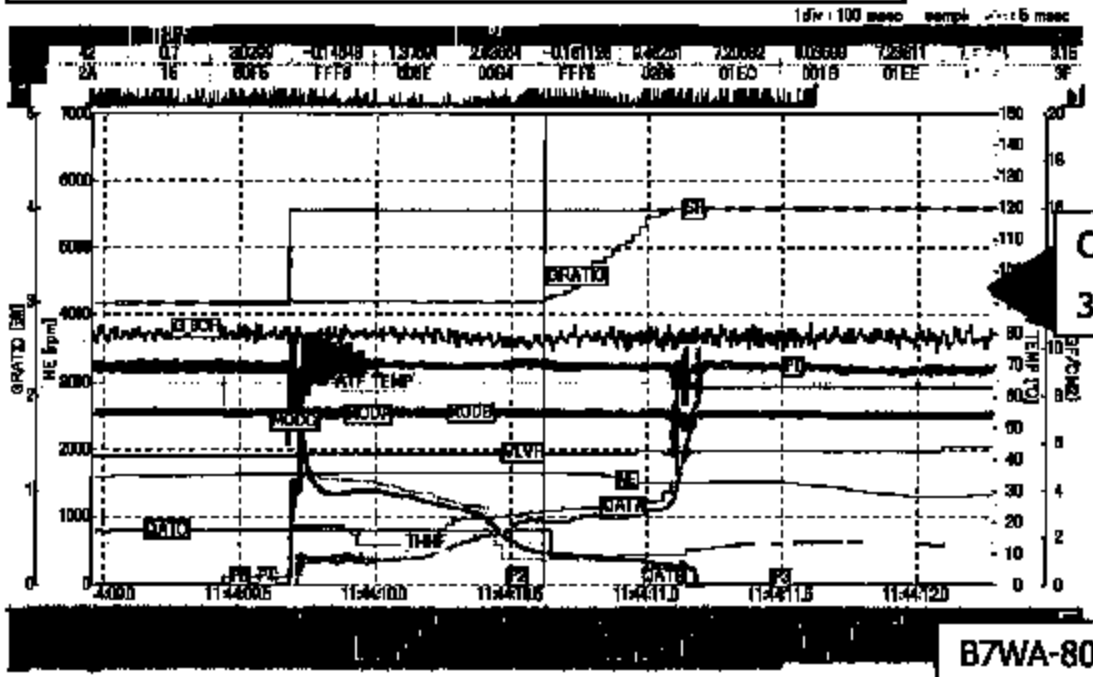
B7WA-8014113 2-3 Shift Cold Condition (TH1/8 , 72C)



CONCLUSION:

2-3shift OK. Pressure OK.

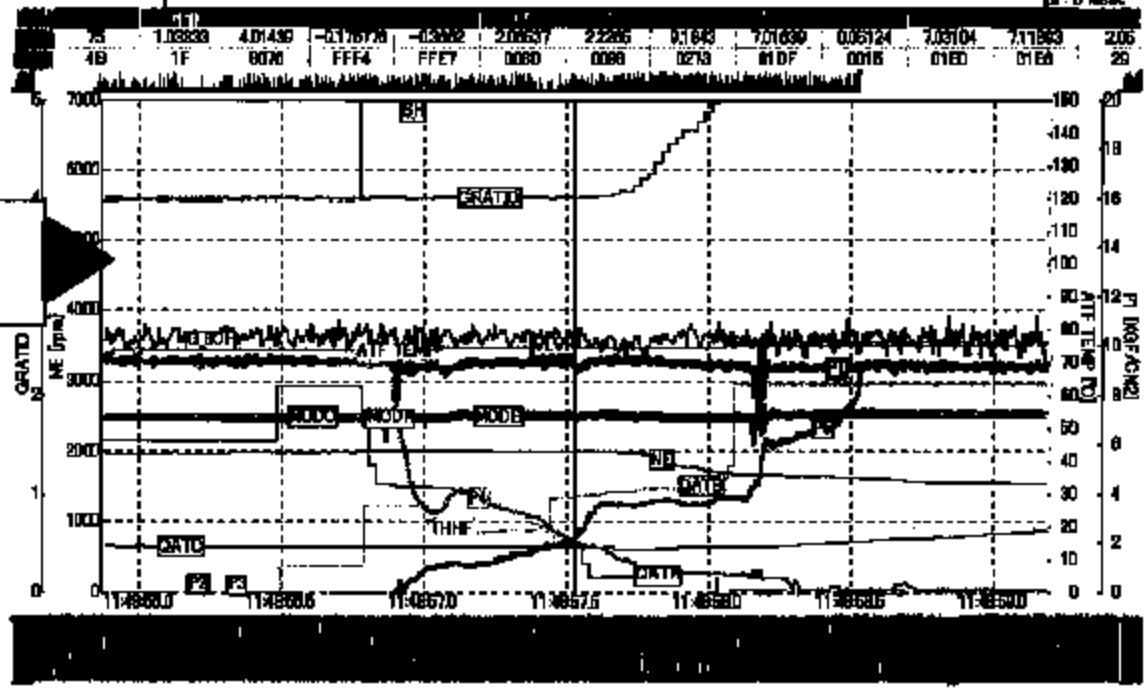
B7WA-8014113 3-4 Shift Cold Condition (TH1/8 , 64C)



CONCLUSION:

3-4shift OK. Pressure OK.

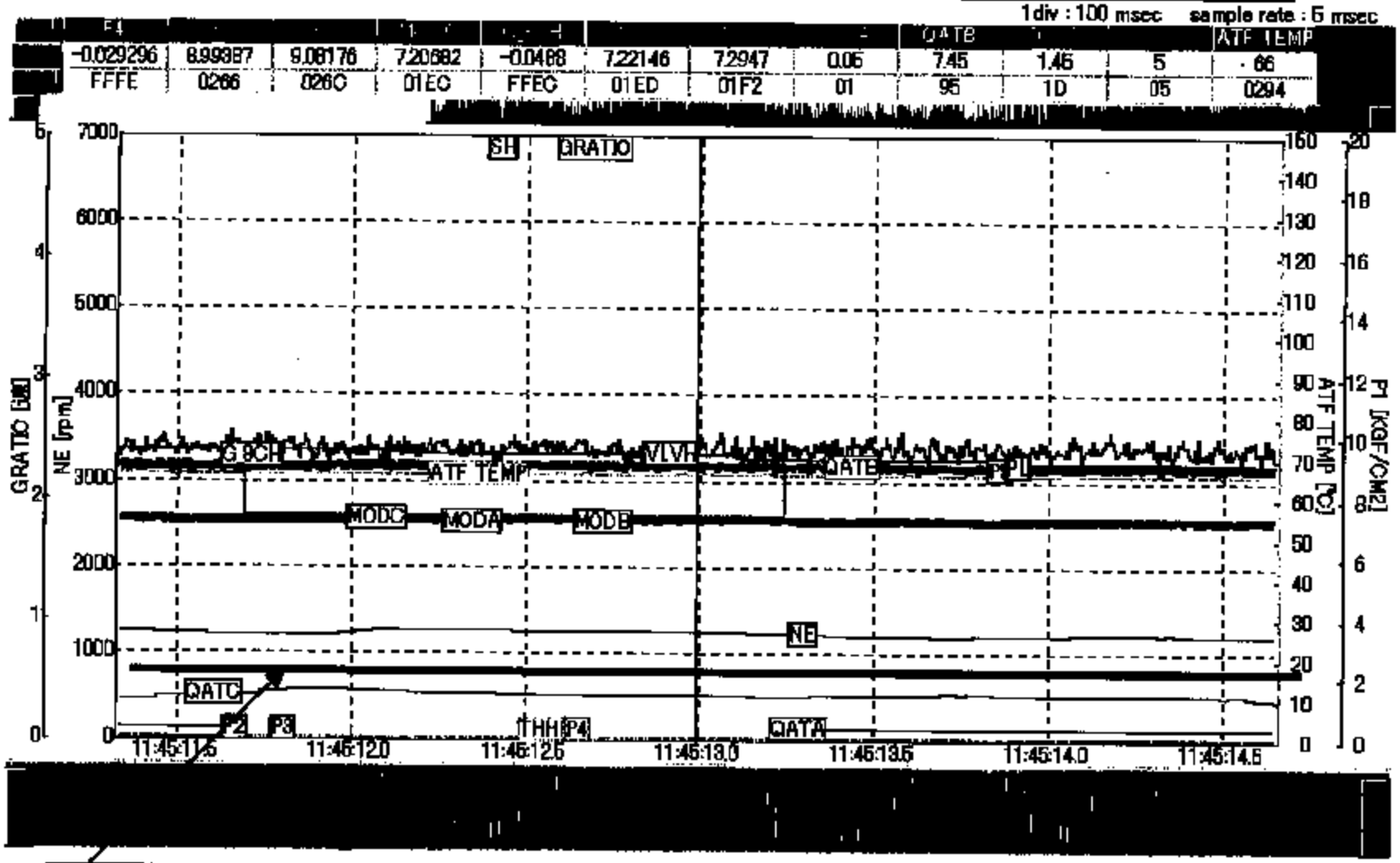
B7WA-8014113 4-5 Shift Cold Condition (TH1/8 , 73C)



CONCLUSION:

4-5shift OK. Pressure OK.

B7WA-8014113 5th cruse Cold Condition (TH off , 66C)

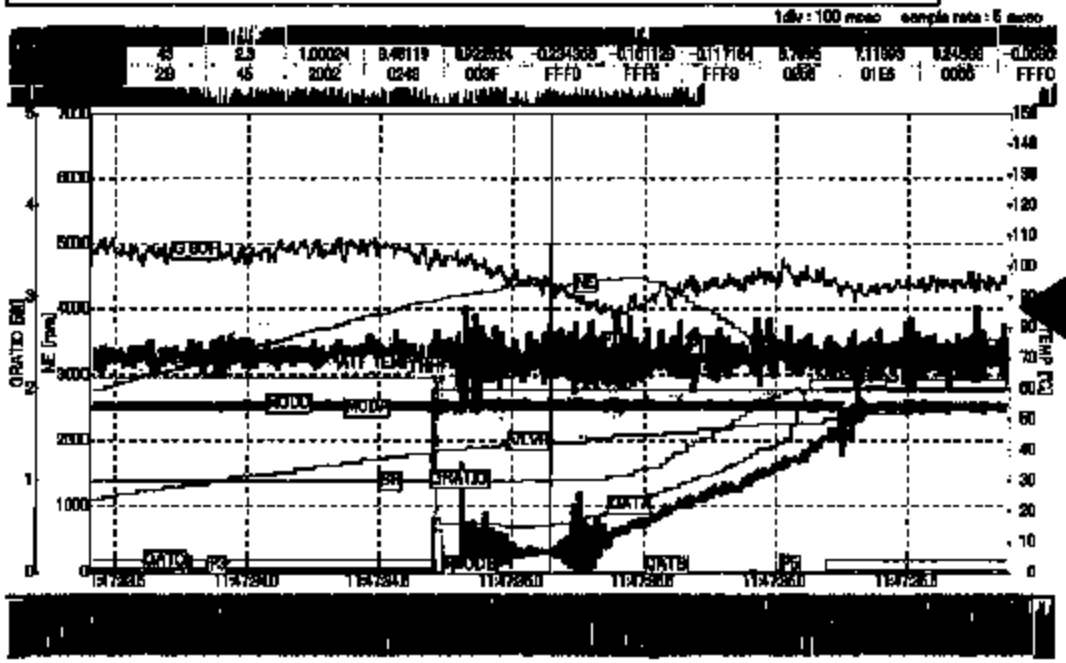


MOD Pressure Failure Point; Where mod pressure is overcome by shift valve C spring pressure.

CONCLUSION:

Sudden down shift didn't happen.
Modulator pressure did not fall below (2 KGF/Cm^2). So sudden down shift is not a possibility on this transmission.
Modulator pressure was below normal but able to overcome spring pressure.

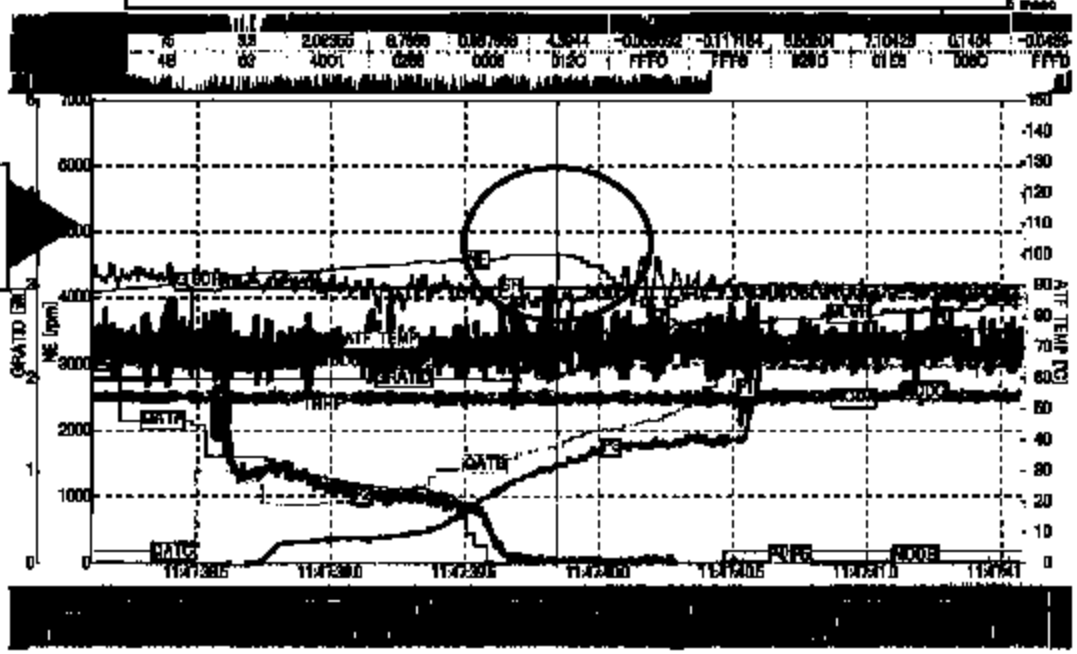
B7WA-8014113 1-2 Shift Cold Condition (TH3/8 , 70C)



CONCLUSION:

Line Pressure, 1st Clutch and 2nd Clutch Pressure are Ok. (The cause vibrated line pressure is guessed noise.)

B7WA-8014113 2-3 Shift Cold Condition (TH3/8 , 73C)

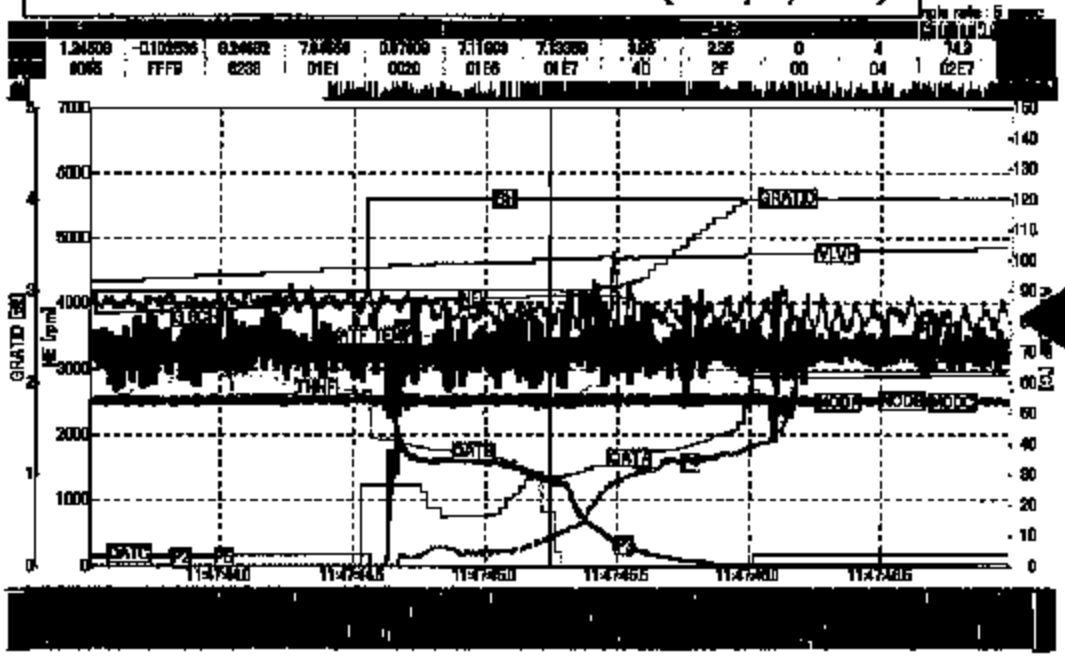


CONCLUSION:

Slipping found in 3rd Gear on 2-3 up shift.

2-3 shift slipping occurred . But it is possible to shift .

B7WA-8014113 3-4 Shift Cold Condition (TH3/8 , 73C)

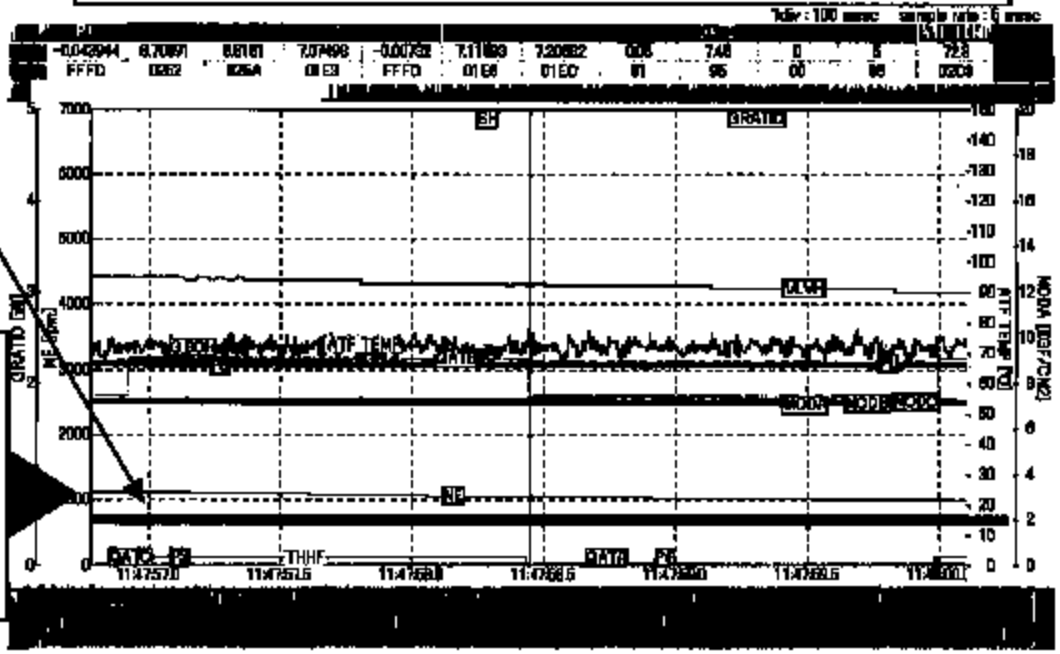


CONCLUSION:

3-4shift OK. Pressure OK.

B7WA-8014113 5th cruse Cold Condition (TH off , 72C)

MOD Pressure Failure Point;
Where mod pressure is overcome by shift valve C spring pressure.

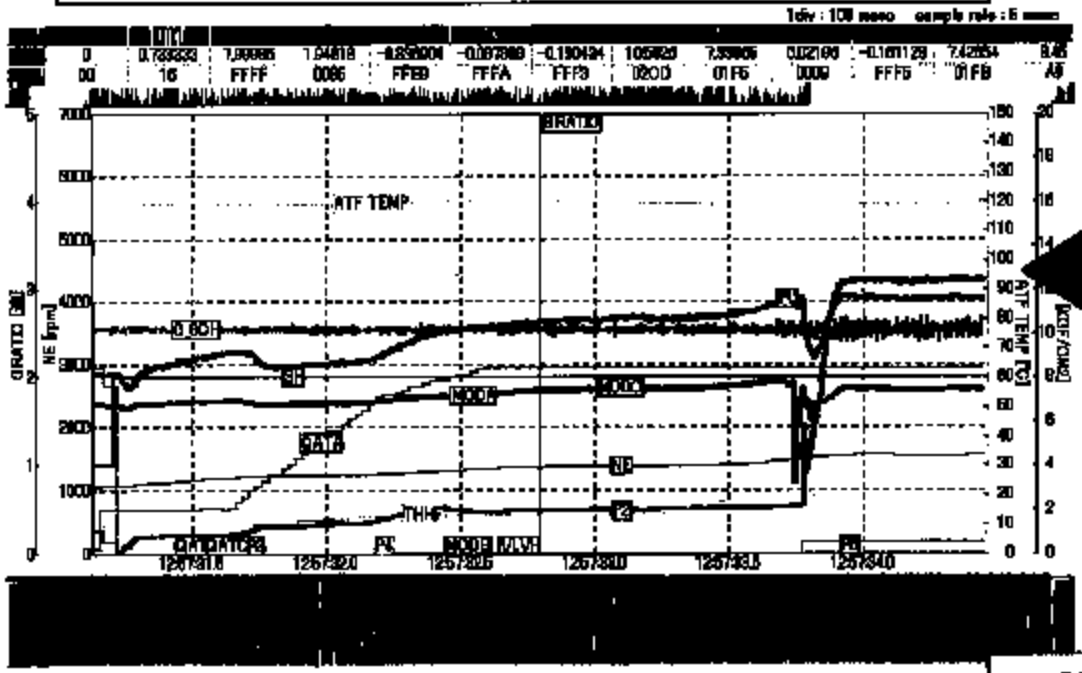


CONCLUSION:

Sudden down shift didn't happen.
Modulator pressure did not fall below (2 KGF/Cm^2).
So sudden down shift is not a possibility on this transmission. Modulator pressure was below normal but able to overcome spring pressure.

B7WA-8014113 Sudden Down Shift Investigation
120C Mode

B7WA-8014113 1-2 Shift HOT Condition (112C)



CONCLUSION:

2nd clutch slipped for long time.

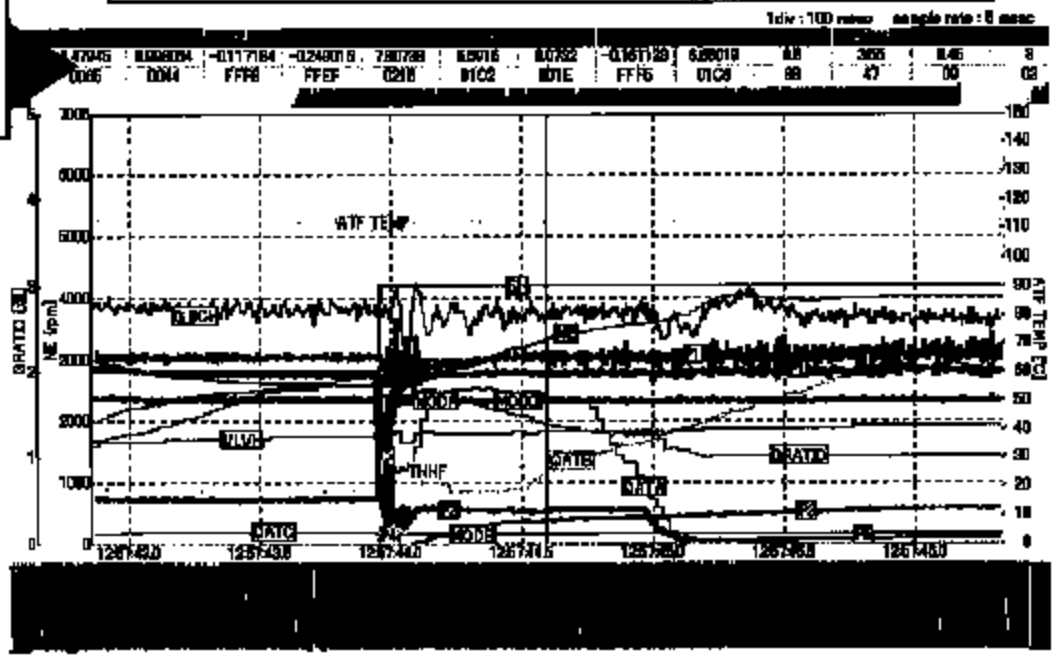
CONCLUSION:

Major slipping was noticed on 2-3 Up Shift.
2nd,3rd clutch pressure didn't increase.

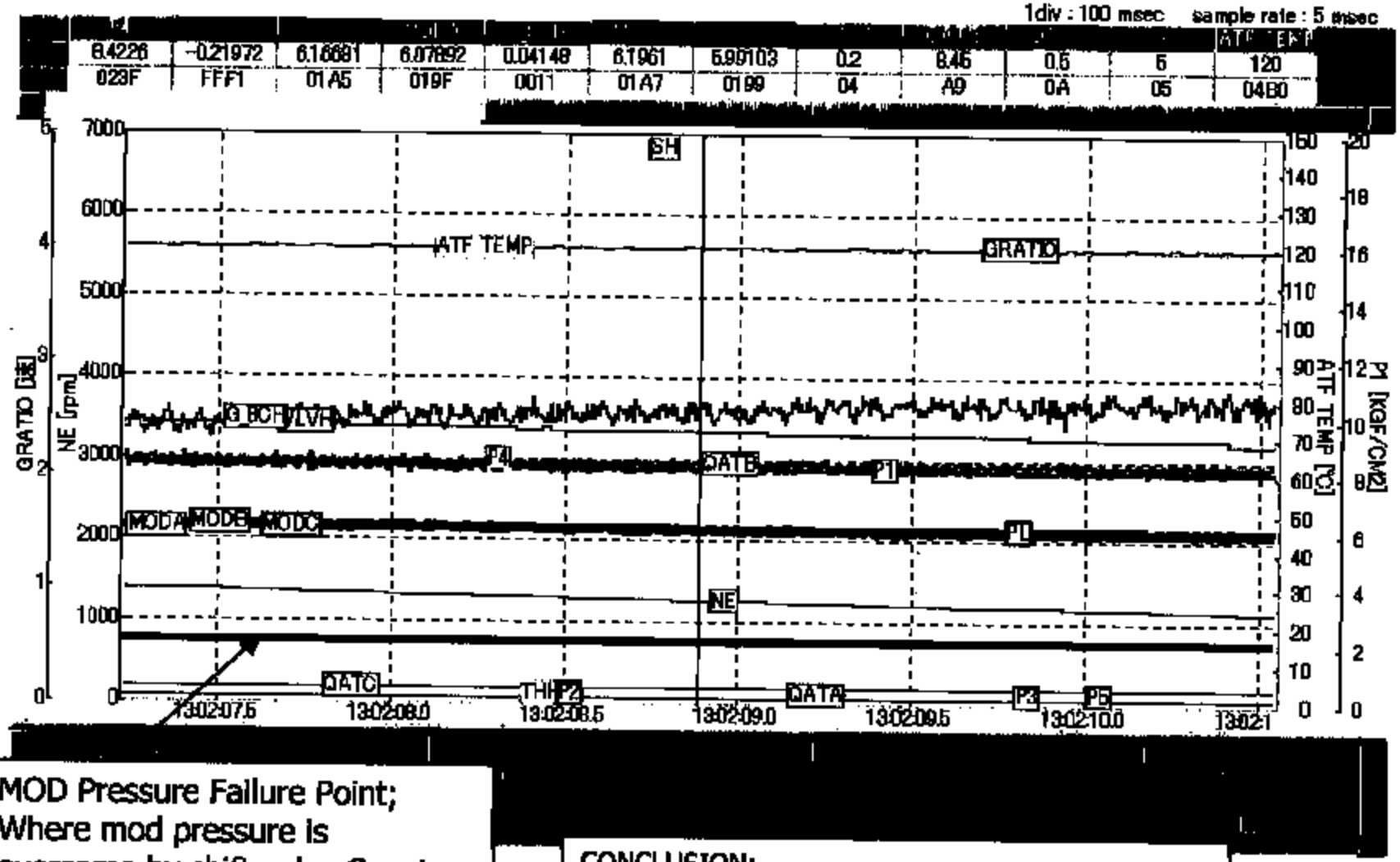
It is impossible to shift normally. Mission entered fail safe mode soon after slipping.

Low clutch pressure is due to screen clogging, causing decrease in supply pressure from pressure sharing to other clutches.

B7WA-8014113 2-3 Shift HOT Condition (120C)



B7WA-8014113 fail mode(4TH) HOT Condition (112C)



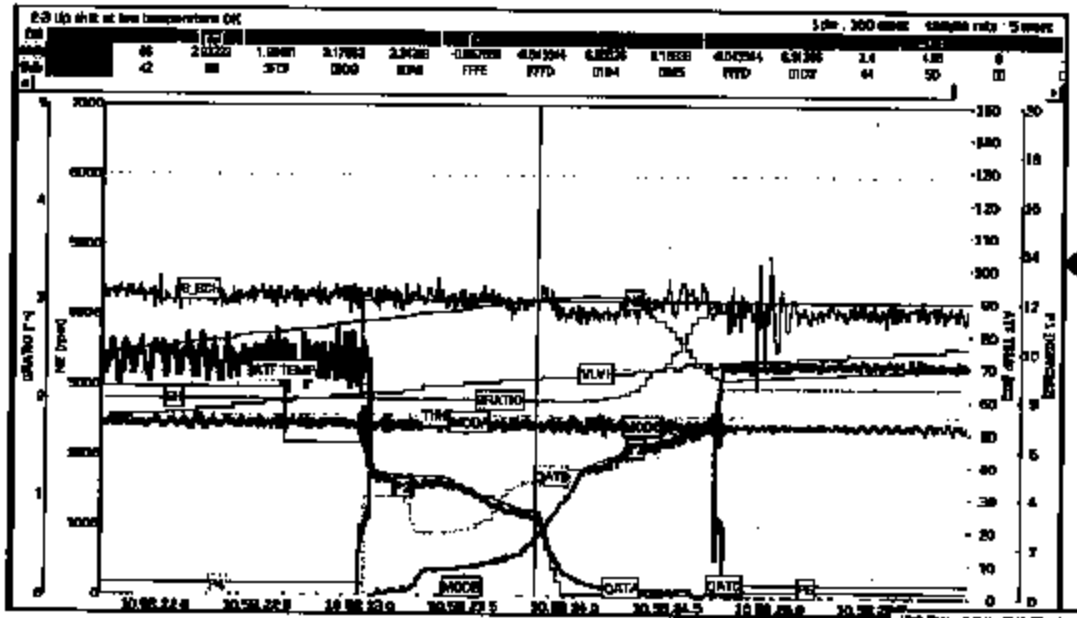
MOD Pressure Failure Point;
Where mod pressure is overcome by shift valve C spring pressure.

CONCLUSION:

Sudden down shift didn't happen.
Modulator pressure did not fall below (2 KGF/Cm²).
So sudden down shift is not a possibility on this transmission. Modulator pressure was below normal but able to overcome spring pressure.

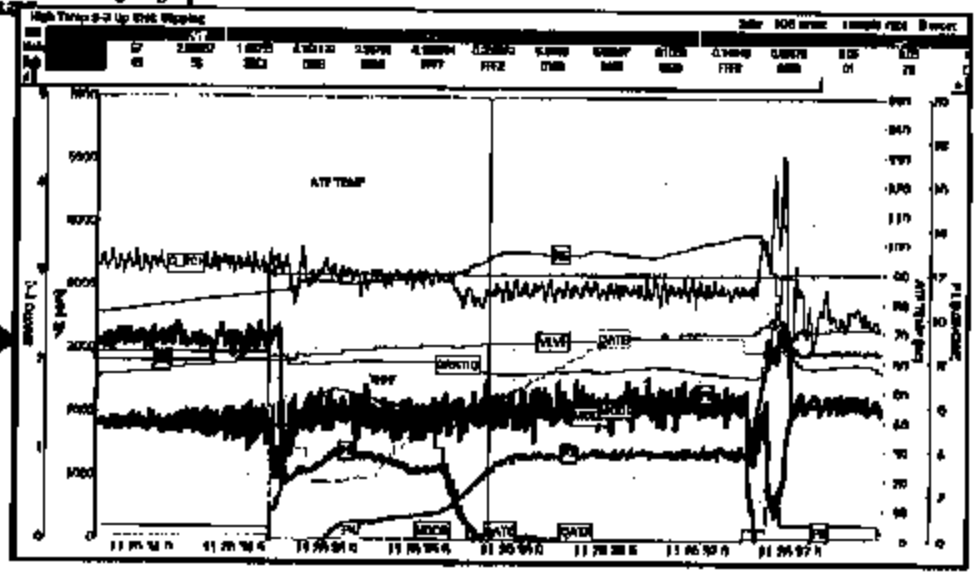
B7WA-8025514 Sudden Down Shift Investigation

B7WA-8025514 Slipping found on 2-3 up shift at temp ~120 ° C



CONCLUSION:

2-3 shift ok at low temperature



CONCLUSION:

Major slipping was noticed on 2-3 Up Shift. 2nd,3rd clutch pressure didn't increase.

Line pressure and Modulator pressure decreased due to screen clog.

CONCLUSION:

Slipping was found in 2-3 up shift. Unable to recreate sudden down shift contention. Low line pressure and modulator pressure due to screen clogging. (Line pressure is taken after screen)

CONFIRMED SUDDEN DOWN SHIFT AT 56 MPH

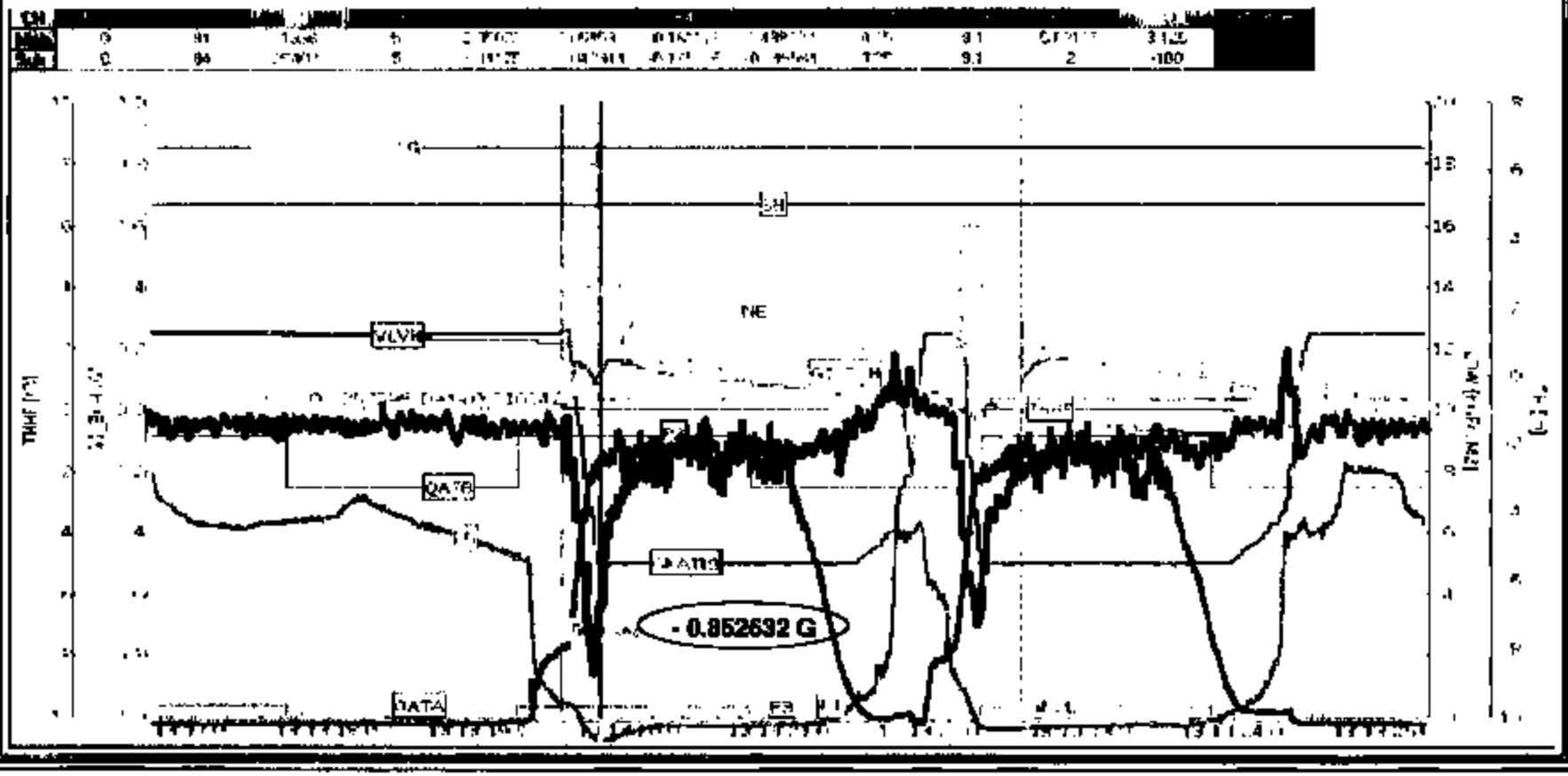
1.) What is the Problem? - **Failure Mode.**

Duplication Test Result Throttle off, coast in 5th Gear

01m TL VIN-19UUA5671A025692 (Mr. Haga's car)

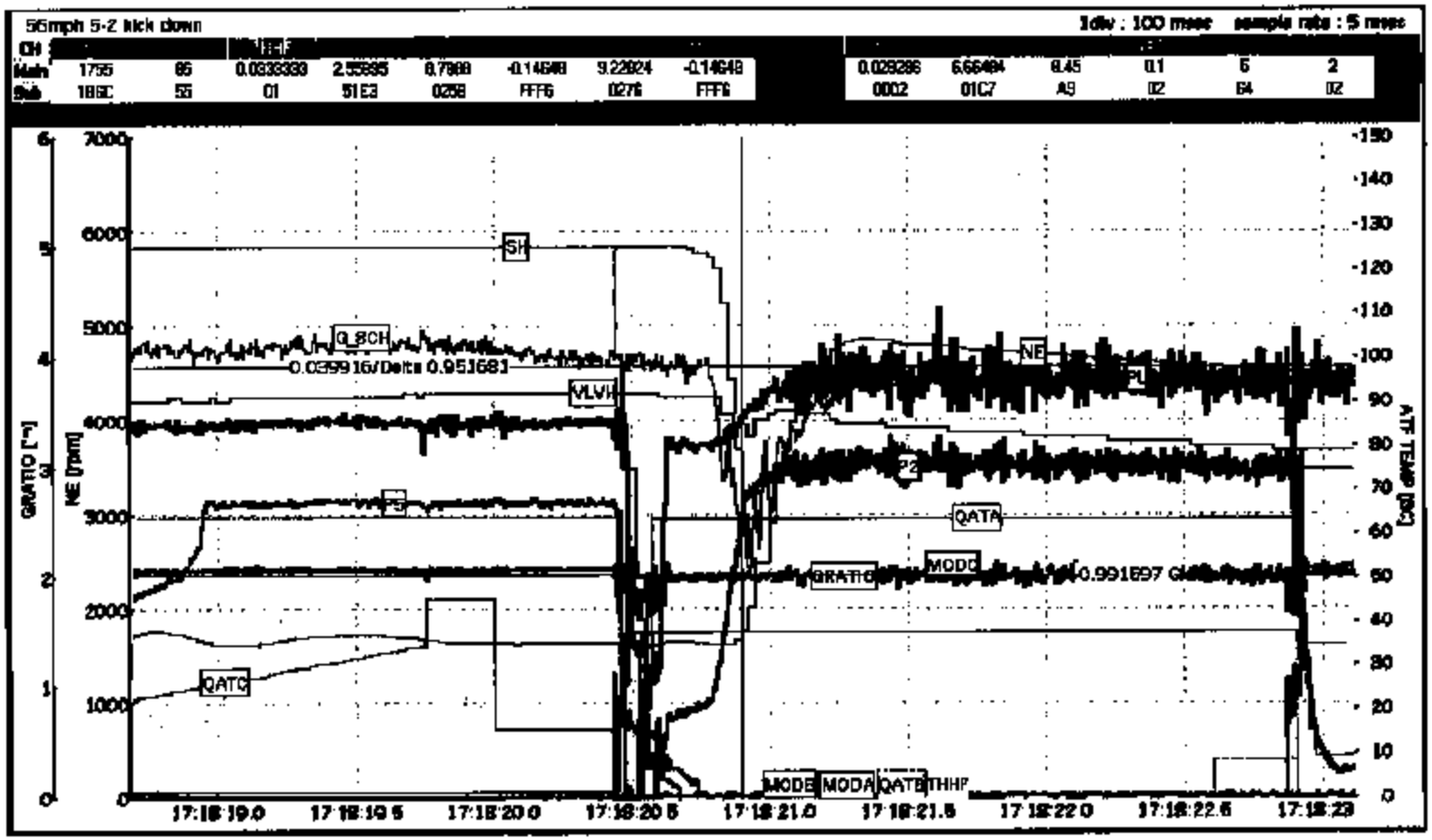
Mission # B7WA-8027653

32,595 miles



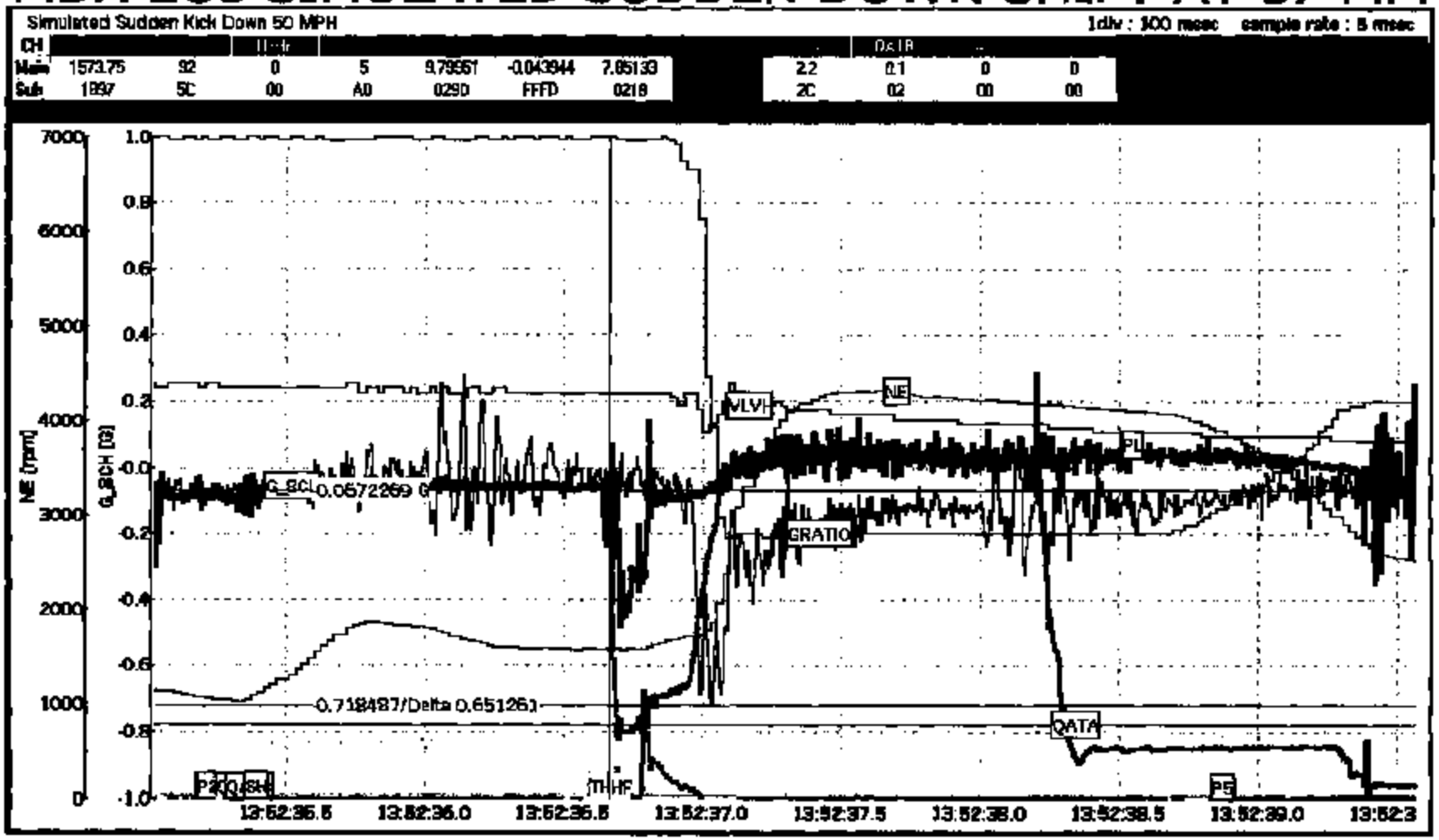
CONCLUSION:
Confirmed Sudden Down Shift Mission at 56 MPH, G Force at -.85 G.

TL ECU SIMULATED SUDDEN DOWN SHIFT AT 56 MPH



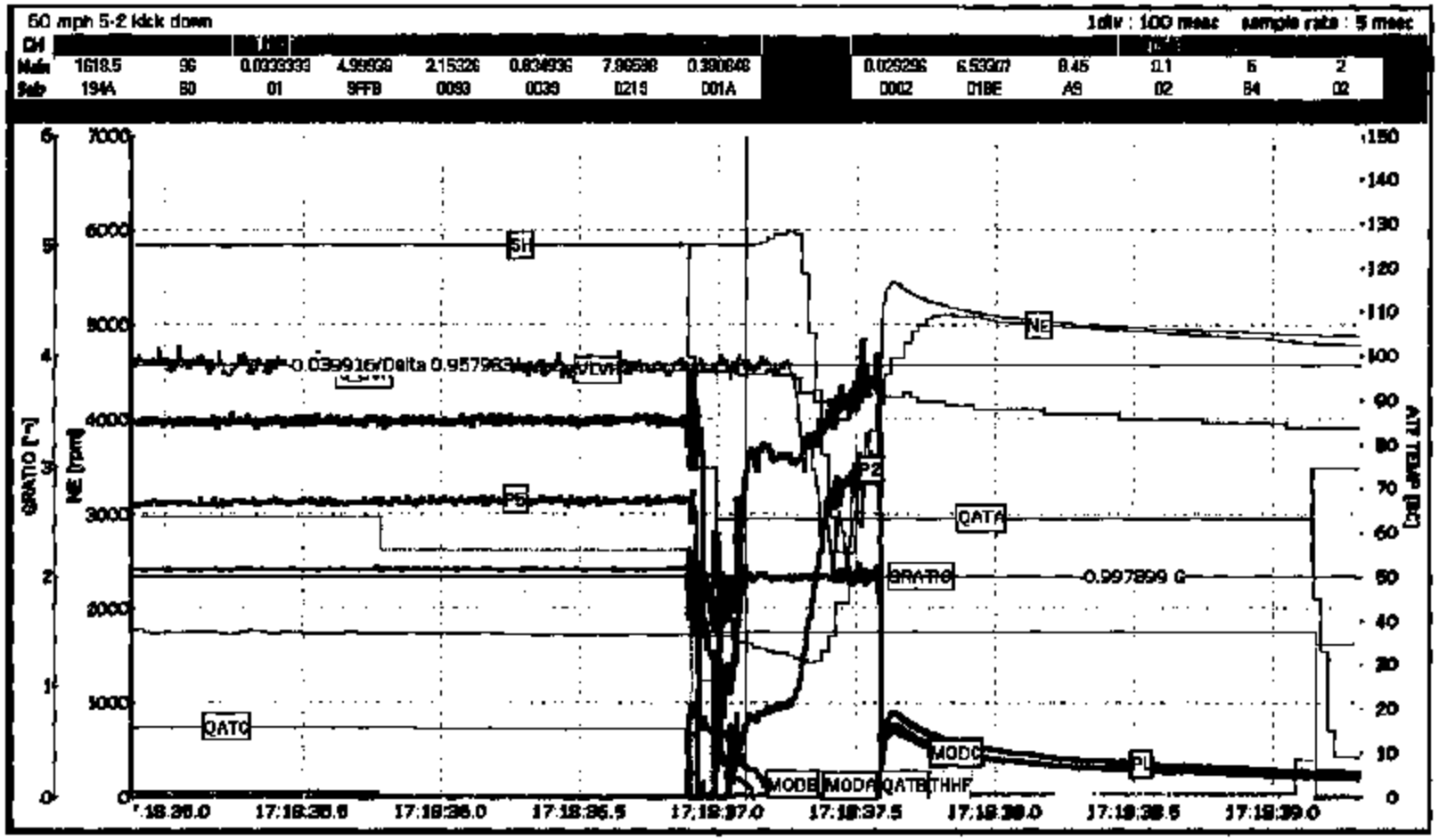
CONCLUSION:
G Force at 56 mph is -.95 G

MDX ECU SIMULATED SUDDEN DOWN SHIFT AT 57 MPH



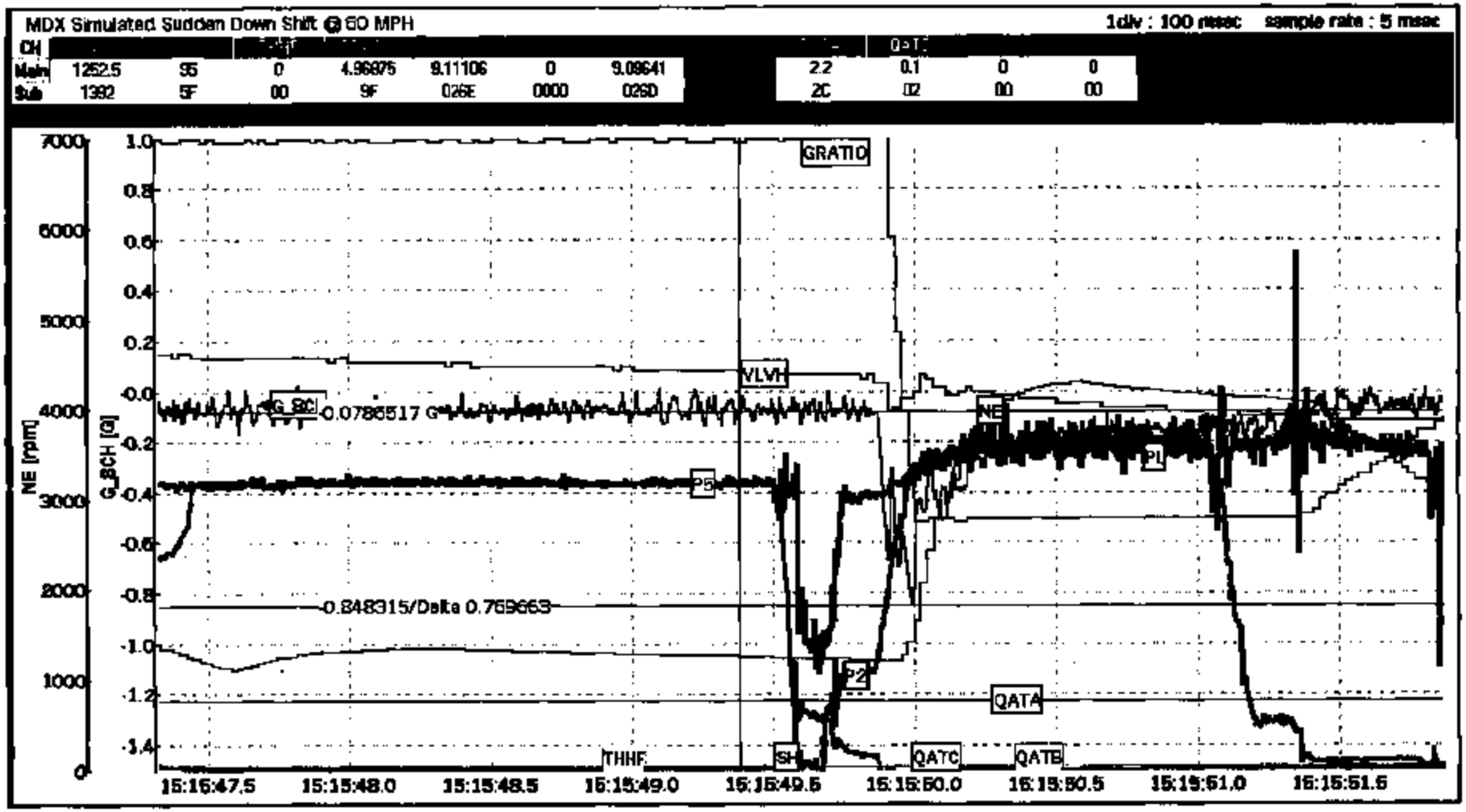
CONCLUSION:
G Force at 56 mph is -.65 G

TL ECU SIMULATED SUDDEN DOWN SHIFT AT 60 MPH



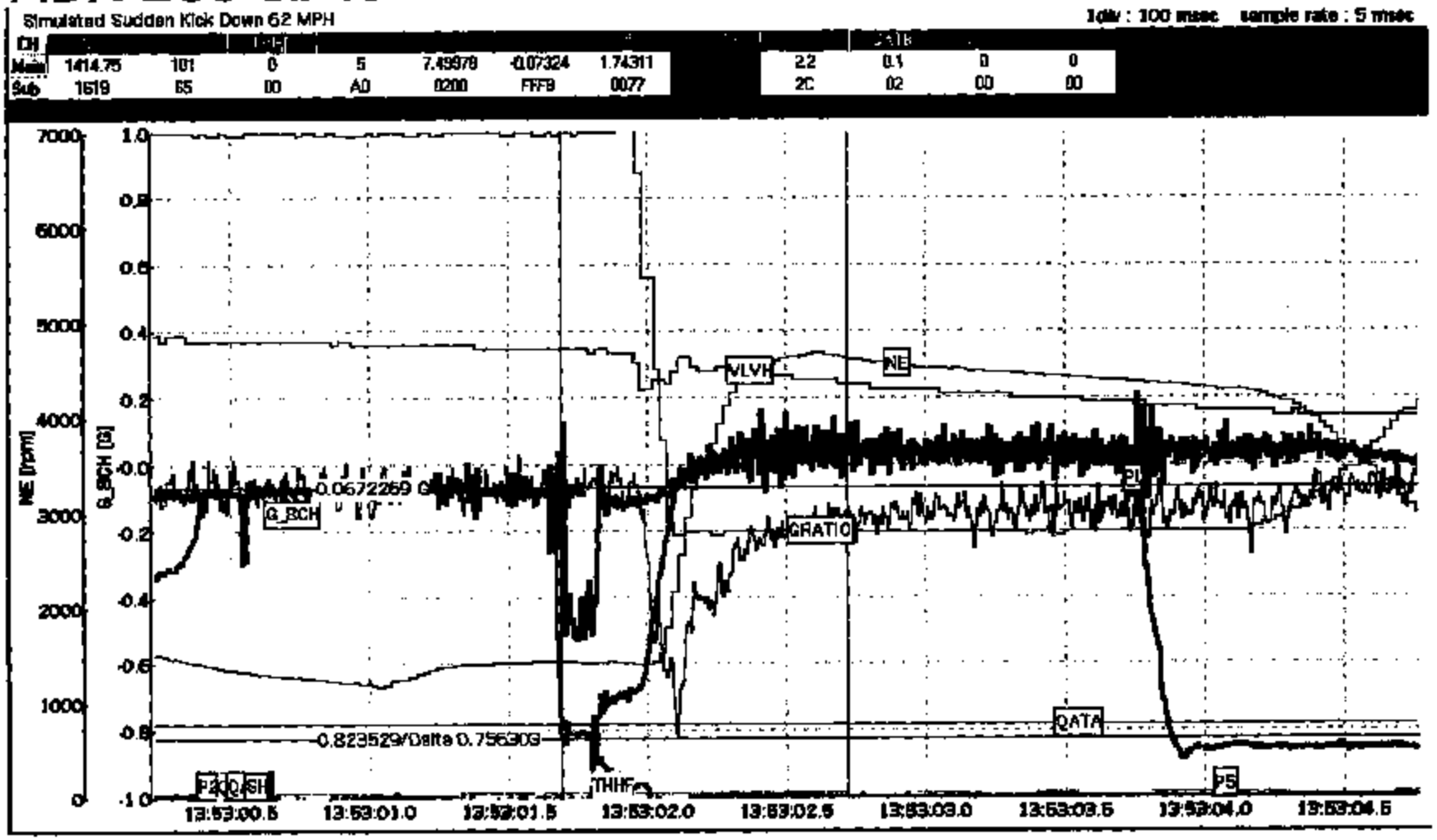
CONCLUSION:
G Force at 60 mph is -.96 G

MDX ECU SIMULATED SUDDEN DOWN SHIFT AT 60 MPH



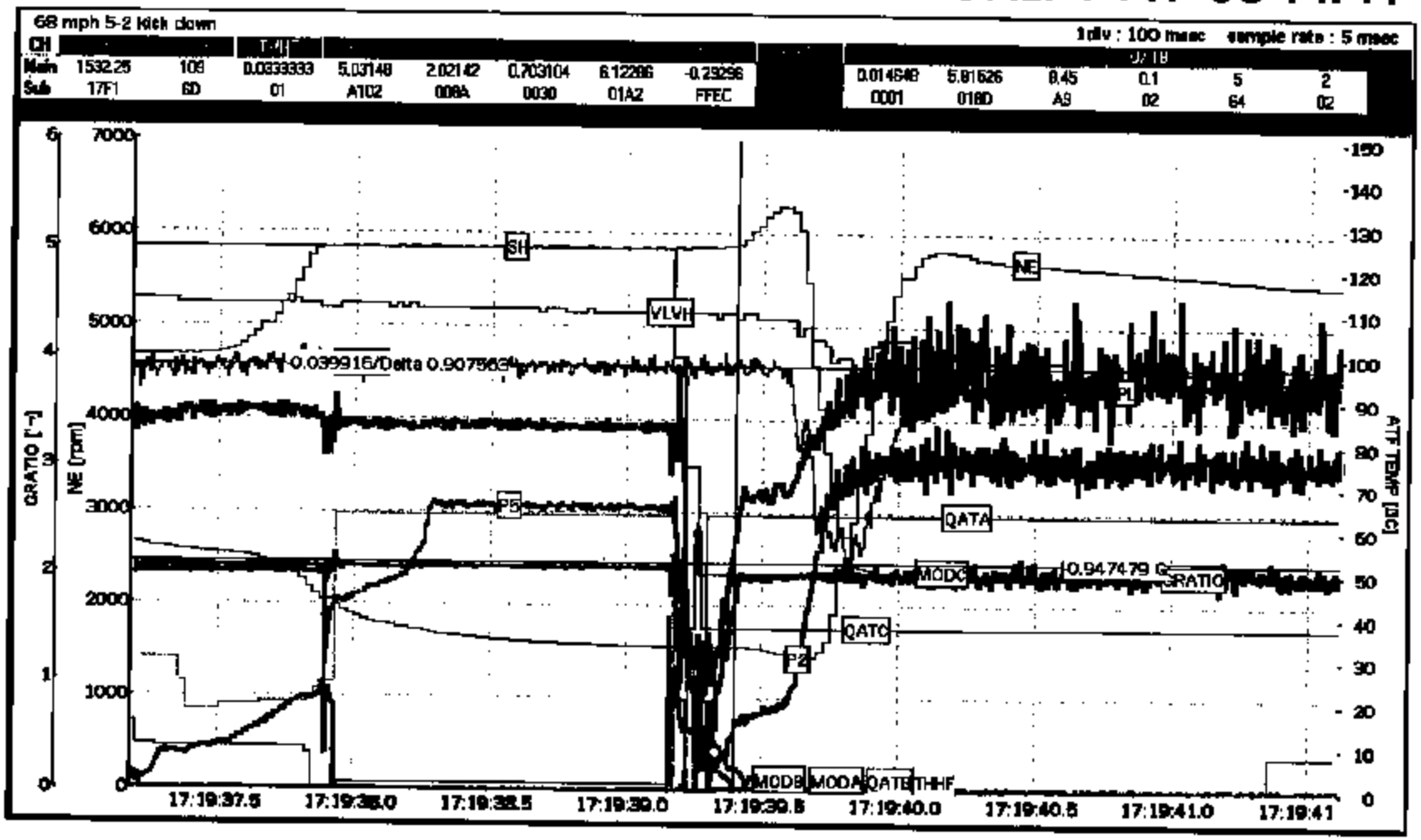
CONCLUSION:
G Force at 60 mph is -.77 G

MDX ECU SIMULATED SUDDEN DOWN SHIFT AT 62 MPH



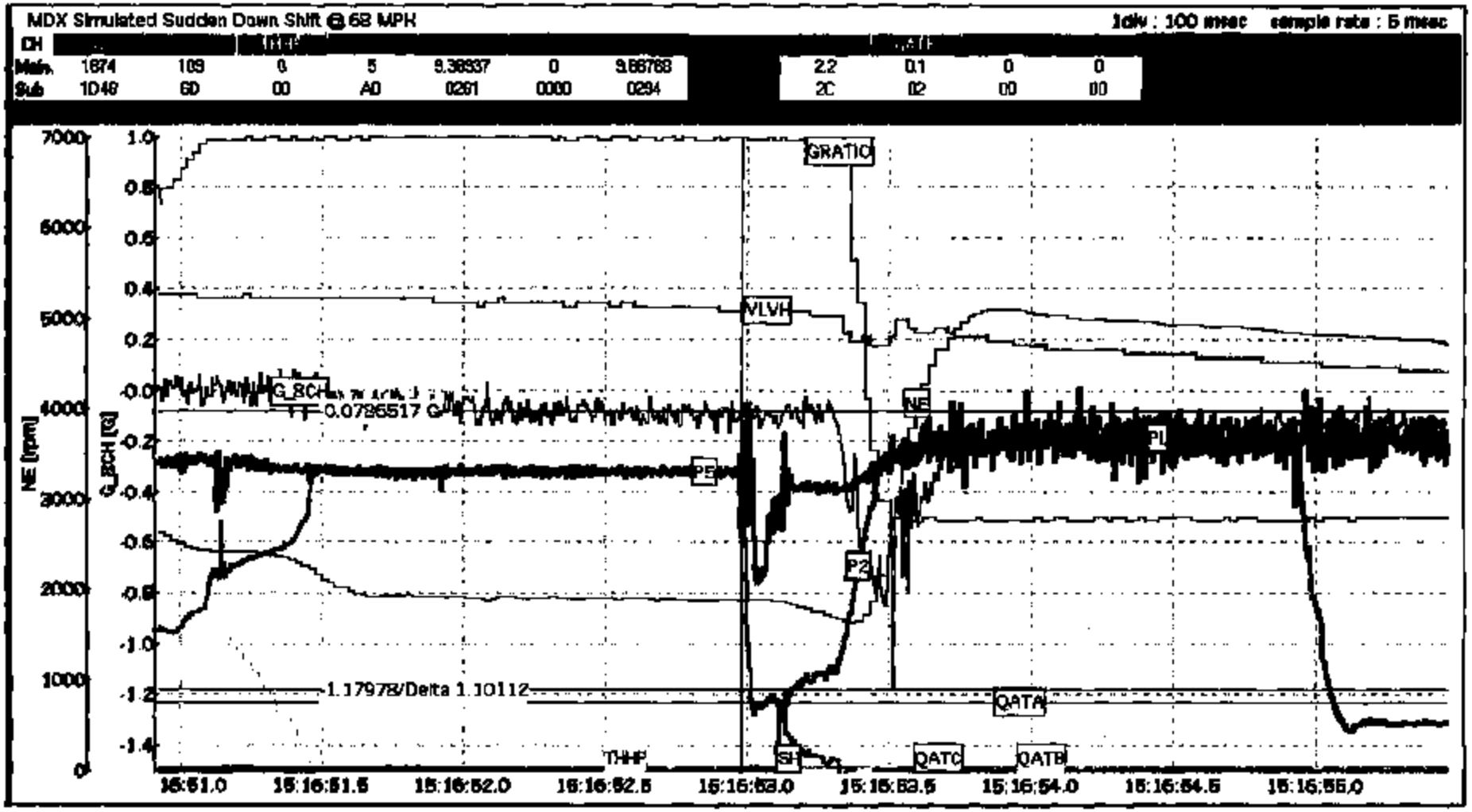
CONCLUSION:
G Force at 60 mph is -.75 G

TL ECU SIMULATED SUDDEN DOWN SHIFT AT 68 MPH



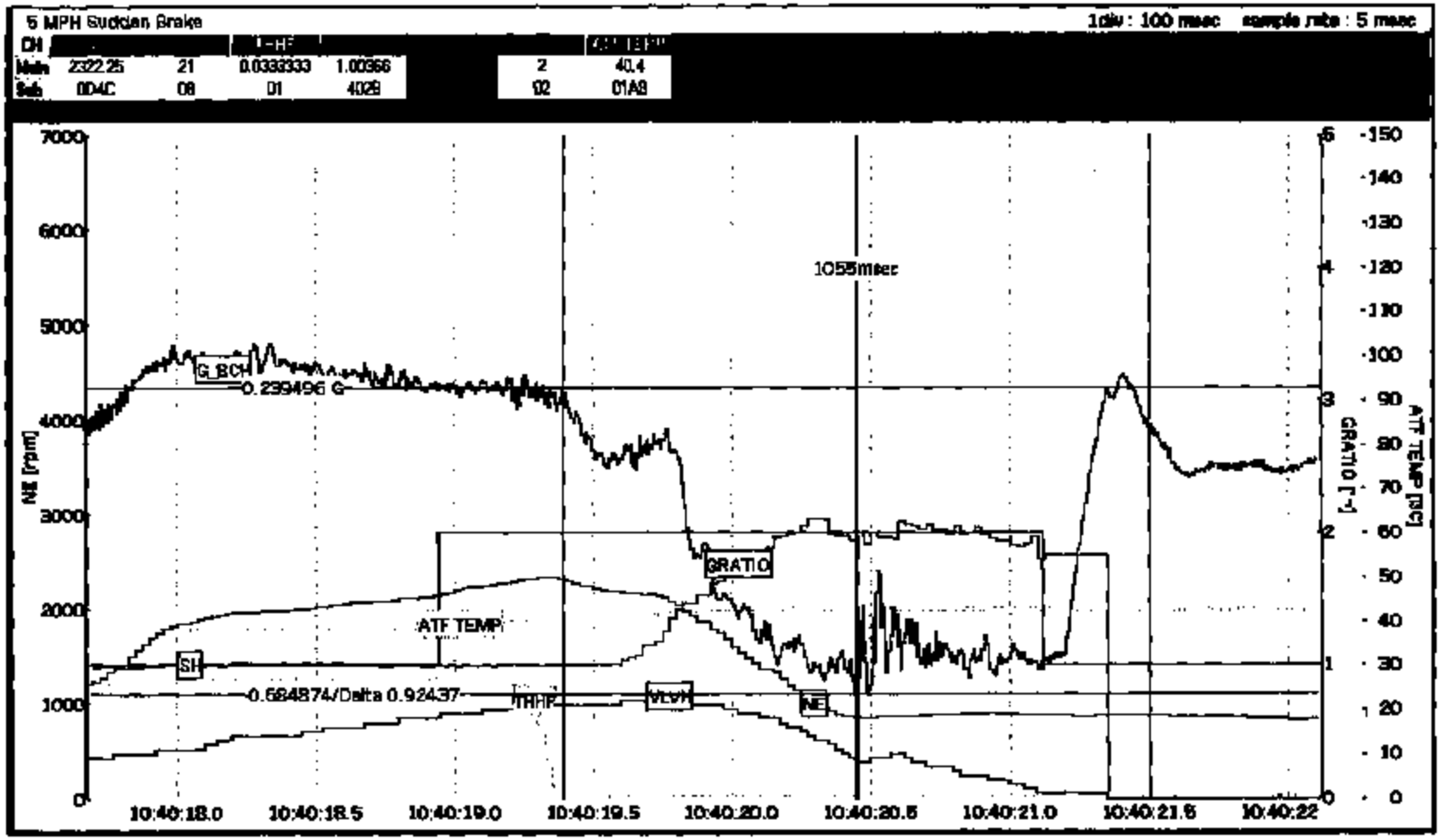
CONCLUSION:
G Force at 68 mph is -.90 G

MDX ECU SIMULATED SUDDEN DOWN SHIFT AT 68 MPH



CONCLUSION:
G Force at 68 mph is -1.10 G

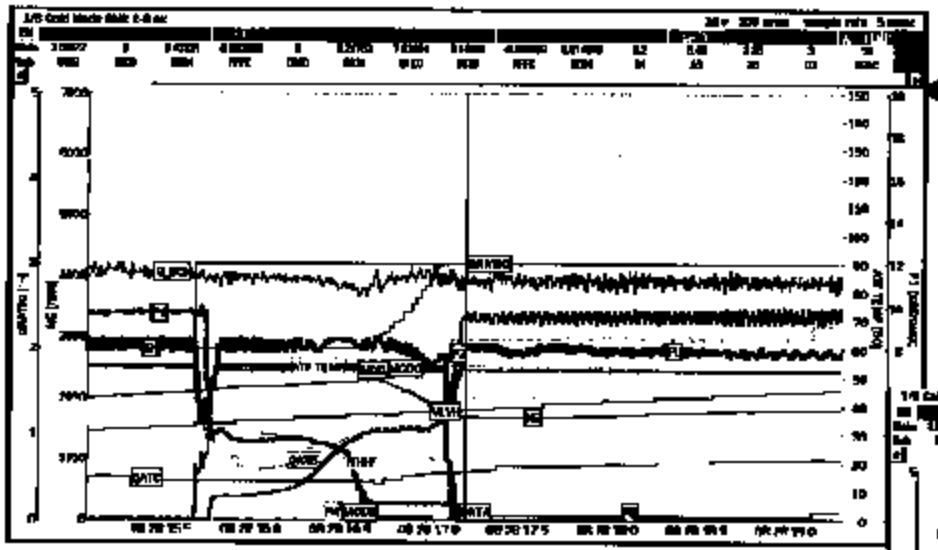
SUDDEN BRAKE G FORCE AT 5 MPH



CONCLUSION:
G Force during sudden brake at 5mph is .92 G.

B7WA-9059518 Sudden Down Shift Investigation

B7WA-9059518 Sudden Down Shift Mission

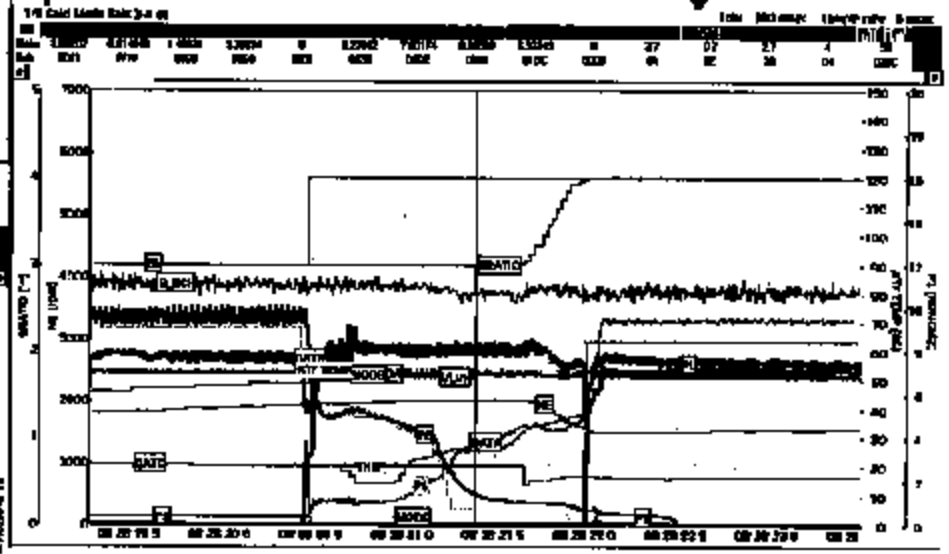


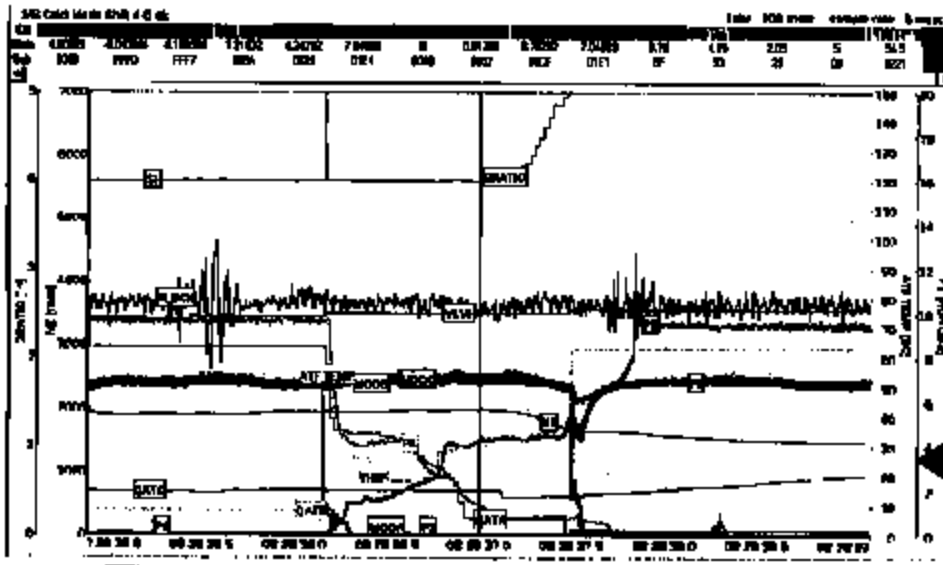
CONCLUSION:

2-3 shift ok at low temperature

CONCLUSION:

3-4 shift ok at low temperature





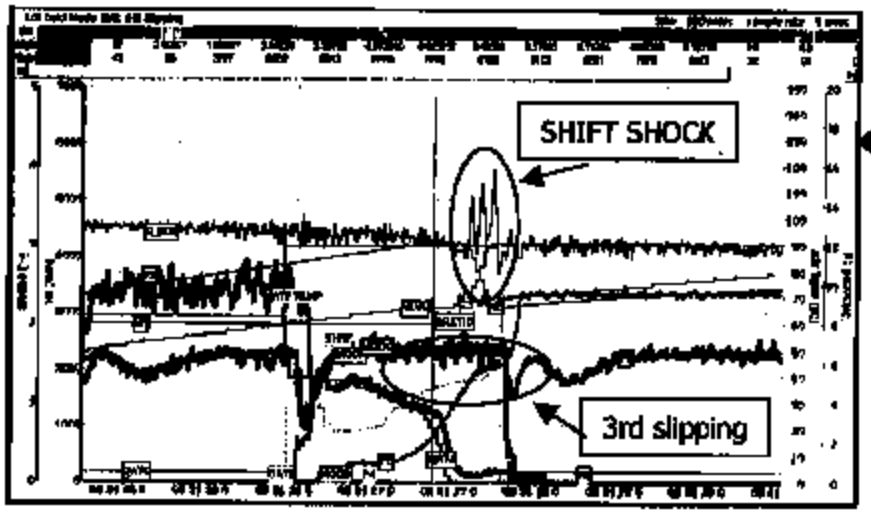
CONCLUSION:

4-5 shift ok at low temperature

CONCLUSION:

Shifting at low ATF temperature (54°C) no abnormal shifting or slipping occurred at 1/8 throttle.

B7WA-9059518 Sudden Down Shift Mission

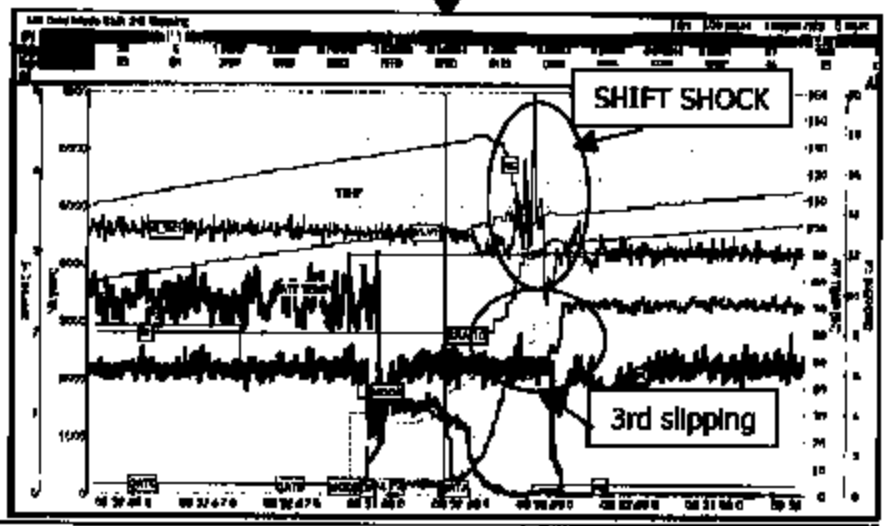


CONCLUSION:

2-3 shift slipping occurred 70° C,
3/8 throttle.

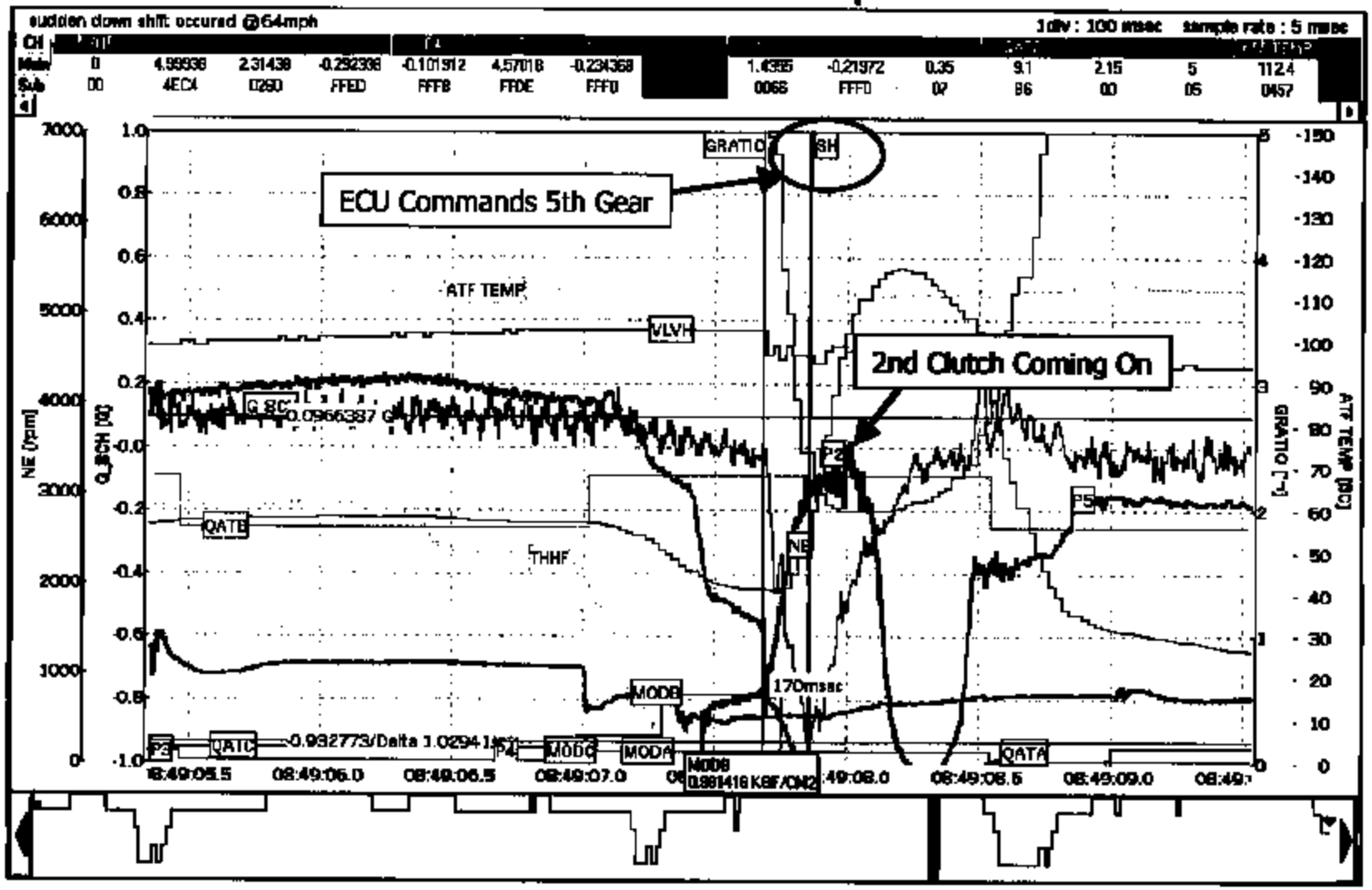
CONCLUSION:

2-3 shift slipping occurred 76° C,
6/8 throttle.



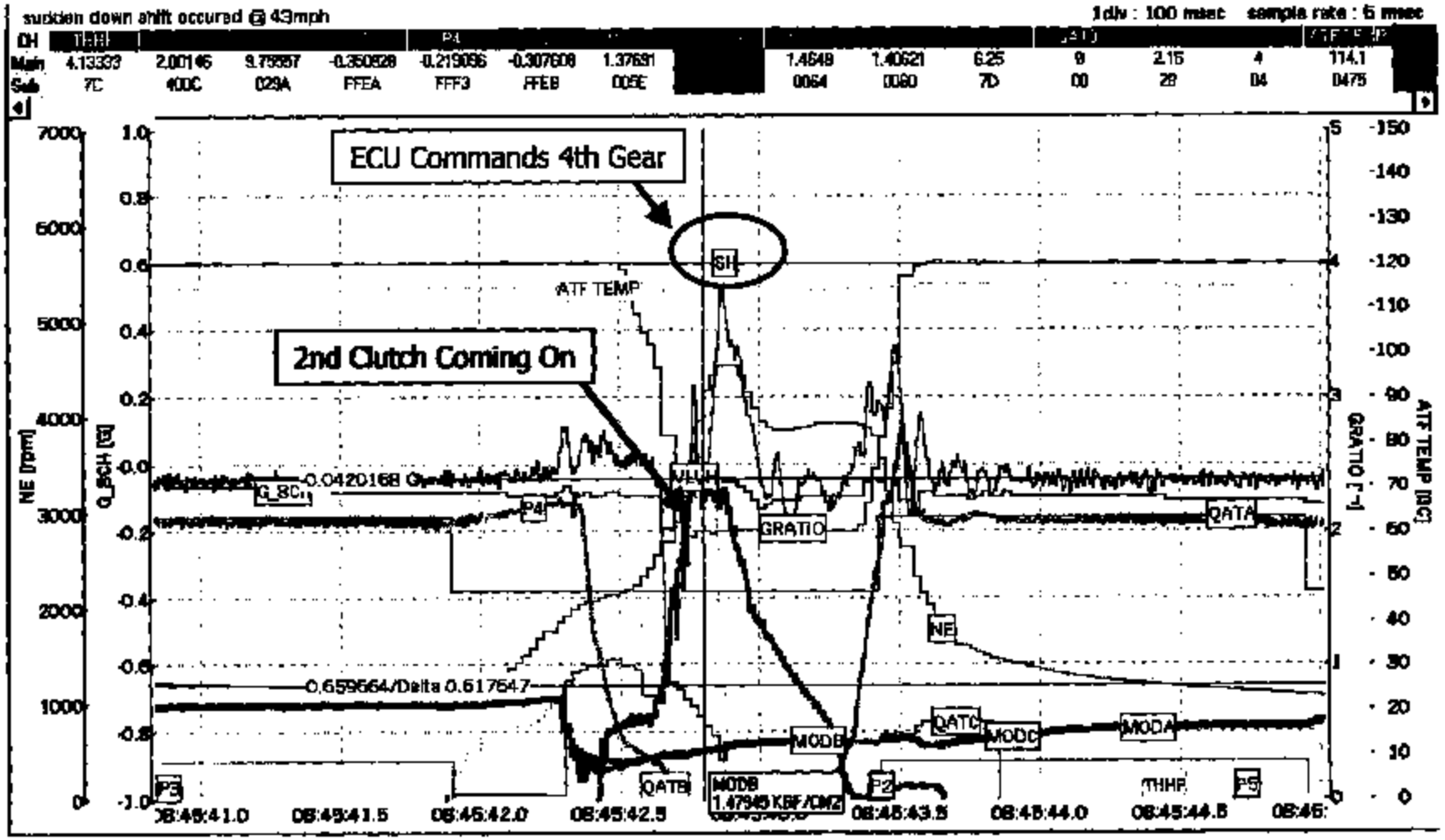
CONCLUSION:
Shifting problem first noticed at 3/8 throttle ~70° C.

5-2 Sudden Down Shift at 64 mph B7WA-9059518



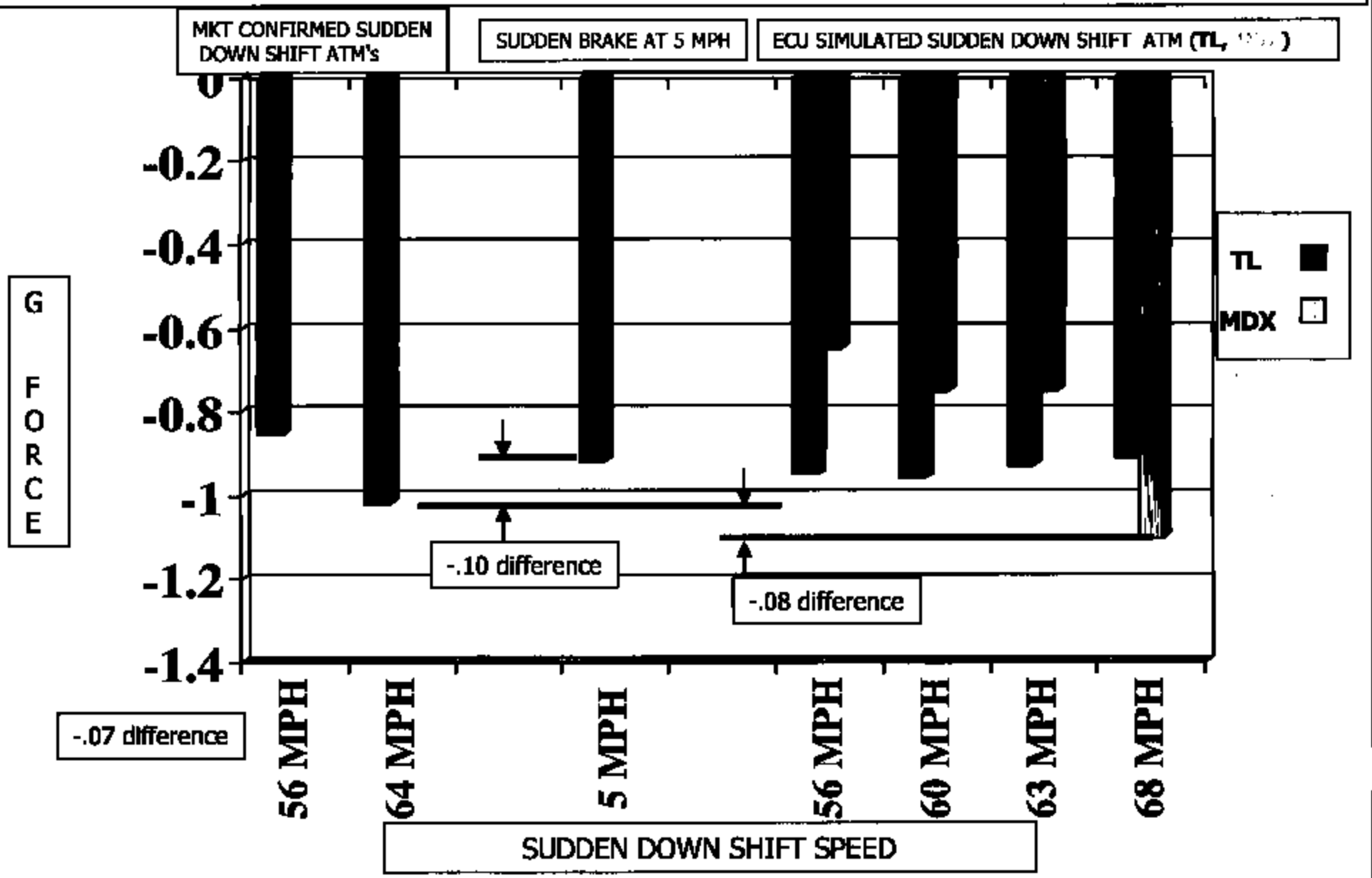
CONCLUSION:
G Force during sudden 5-2 down shift at 64 mph was 1.029 G. (Sudden down shift occurred when MOD pressure dropped below 2kgf/CM^2. 2nd clutch pressure came on with ECU still sending 5th gear command, SH=5)

4-2 Sudden Down Shift at 43 mph B7WA-9059518

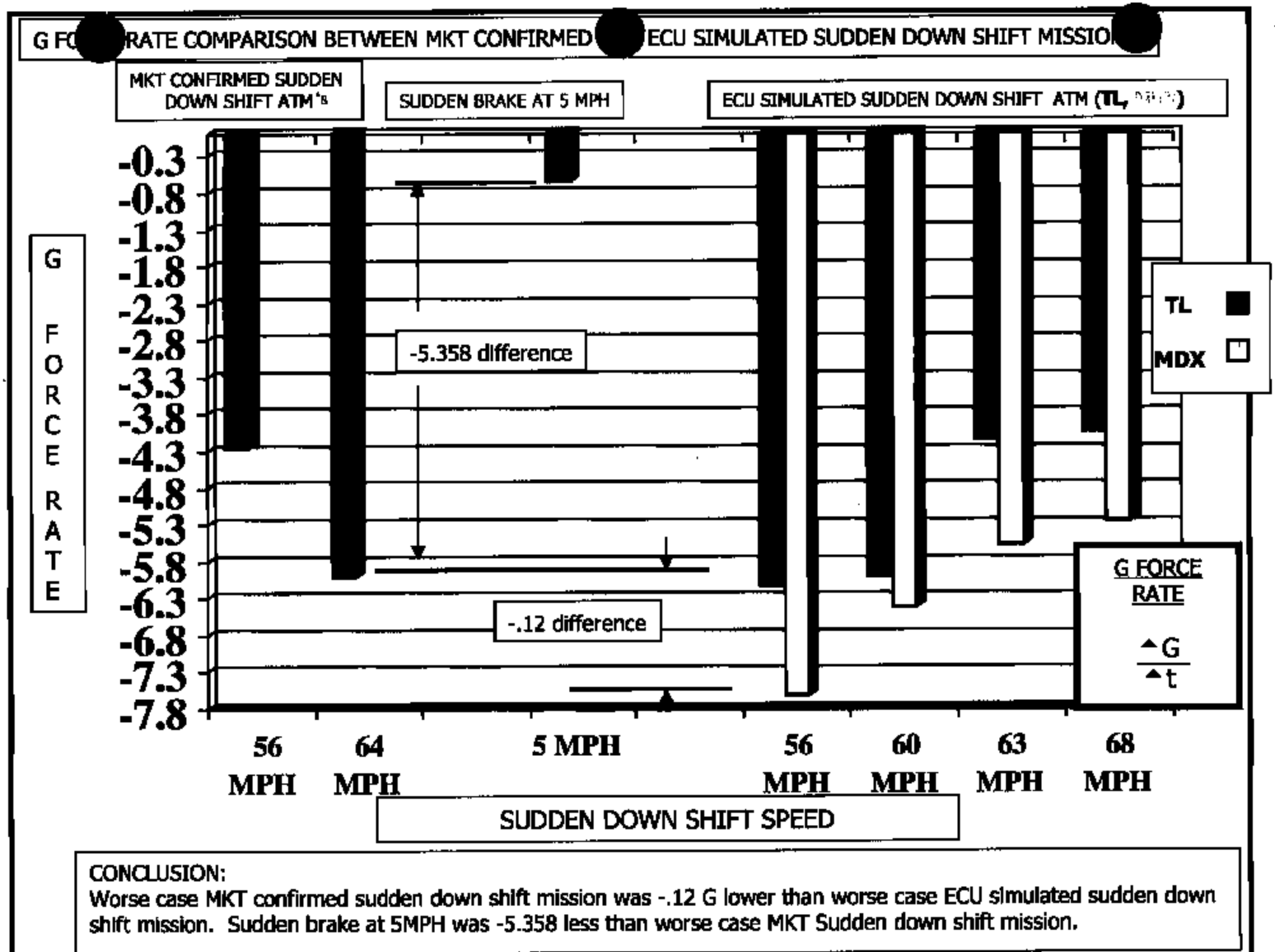


CONCLUSION:
G Force during 4-2csudden down shift at 43 mph was .61 G. (Sudden down shift occurred when MOD pressure dropped below 2kgf/CM^2. 2nd clutch pressure came on with ECU still commanding 4th gear, SH=4)

G FOR[illegible] COMPARISON BETWEEN MKT CONFIRMED [illegible]D ECU SIMULATED SUDDEN DOWN SHIFT [illegible]SSIONS



CONCLUSION:
Worse case MKT failed mission is ~ -.10 G greater than ECU simulated Sudden Down Shift. 5 MPH sudden braking is -.06 less than worse case MKT sudden down shift.



CONCLUSION:
Worse case MKT confirmed sudden down shift mission was -.12 G lower than worse case ECU simulated sudden down shift mission. Sudden brake at 5MPH was -5.358 less than worse case MKT Sudden down shift mission.

3RD Clutch Analysis Summary

MQ Analysis

Oct 25, 2002

PROBLEM EXPLANATION
&
EMCS DATA

Mission #8027653 EMCS DATA ANALYSIS

[redacted]

1. Incident generation process

   ①. 3rd clutch wear and facing material peeling off

   ⬇

   ②. ATF strainer blocked & breakage

   ⬇

   ③. Each screen filter blocking

   ⬇

   ④. Line pressure decrease because of filter blocking

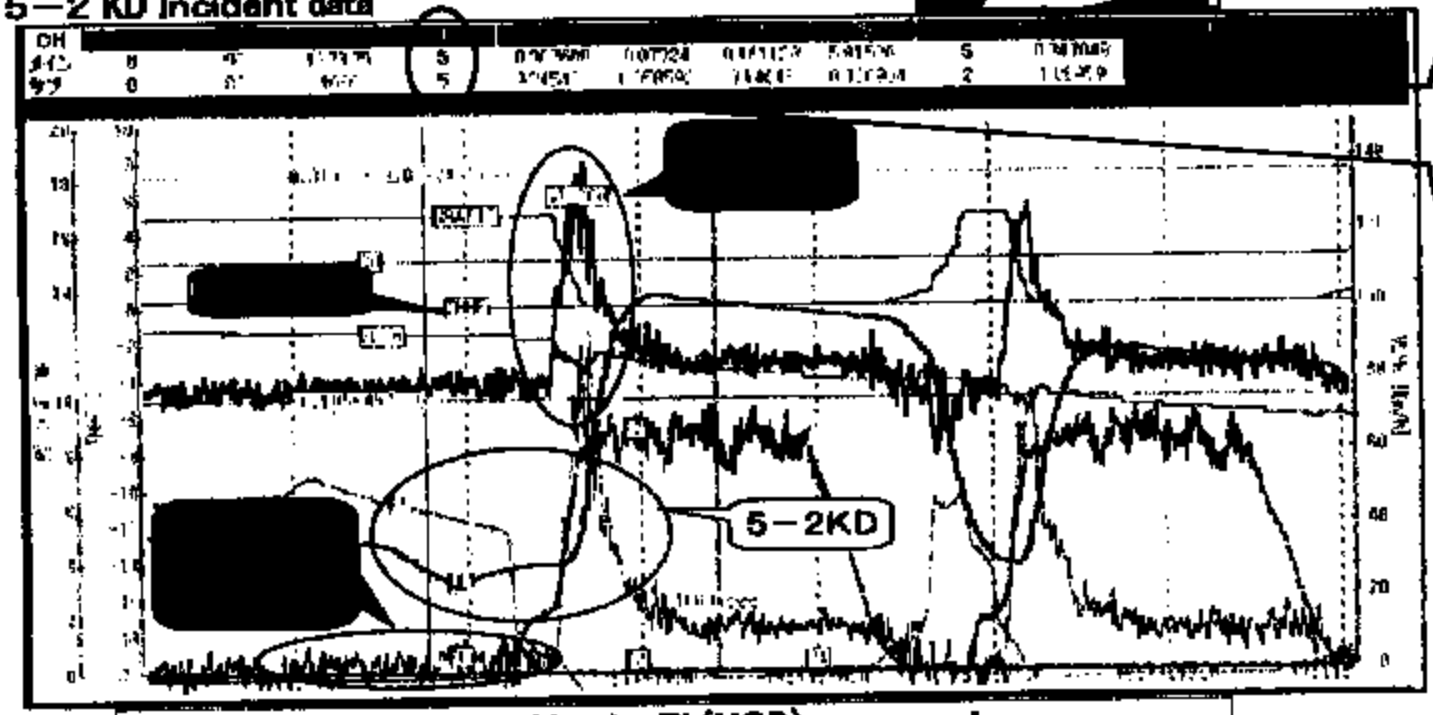
   ⬇

   ⑤. 5-2 KD generation

(ATF Strainer)

(Screen filter)

2. 5—2 KD Incident data

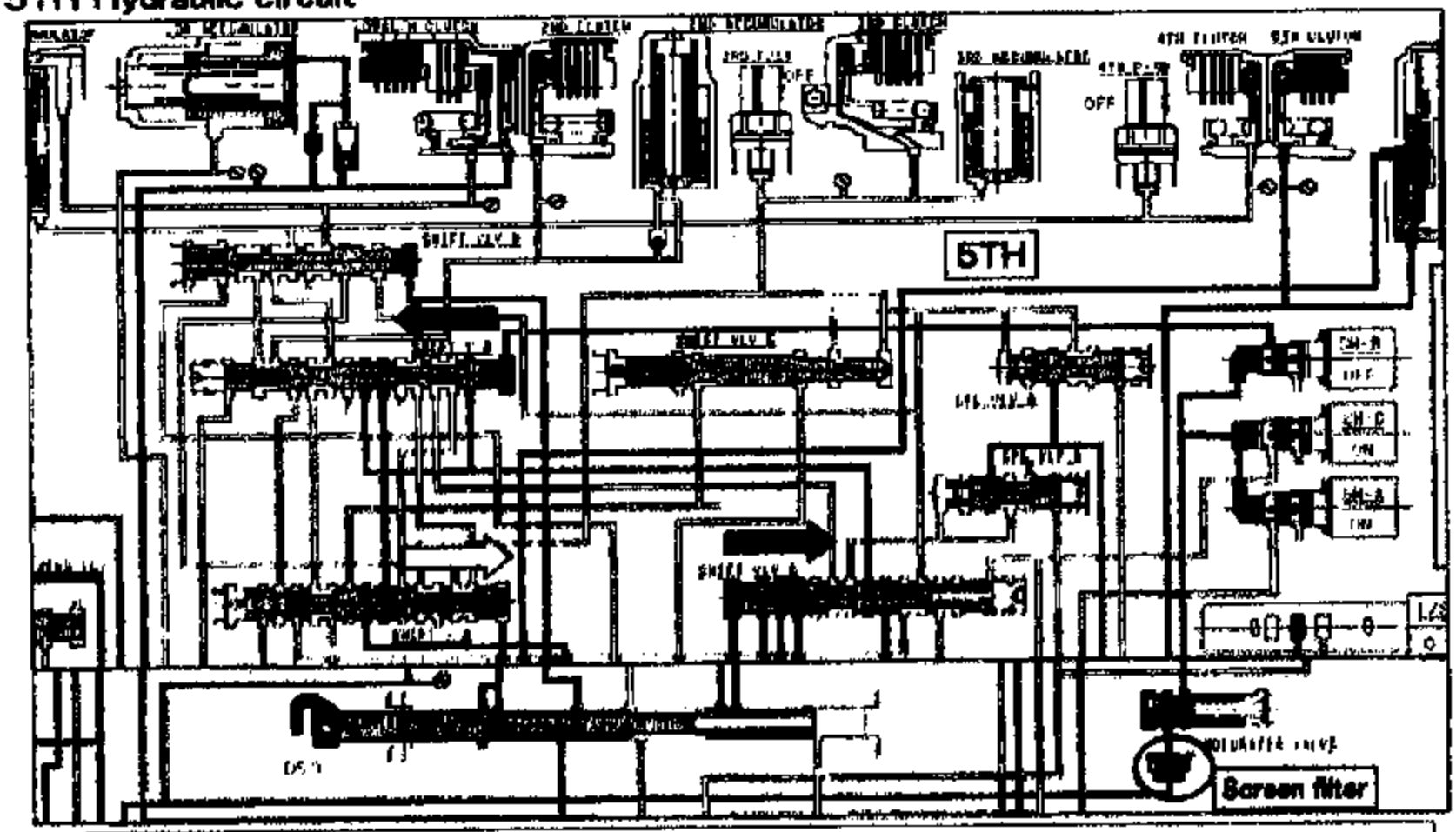


ECU Shift Signal is Position 5 while mission mechanically engages 5-2 KD.

※ 5—2 KD are generated by the PL(MOD) pressure decrease, the shift shock of 0.8G is generated.

Mission #8027653 EMCS DATA ANALYSIS CON'T.

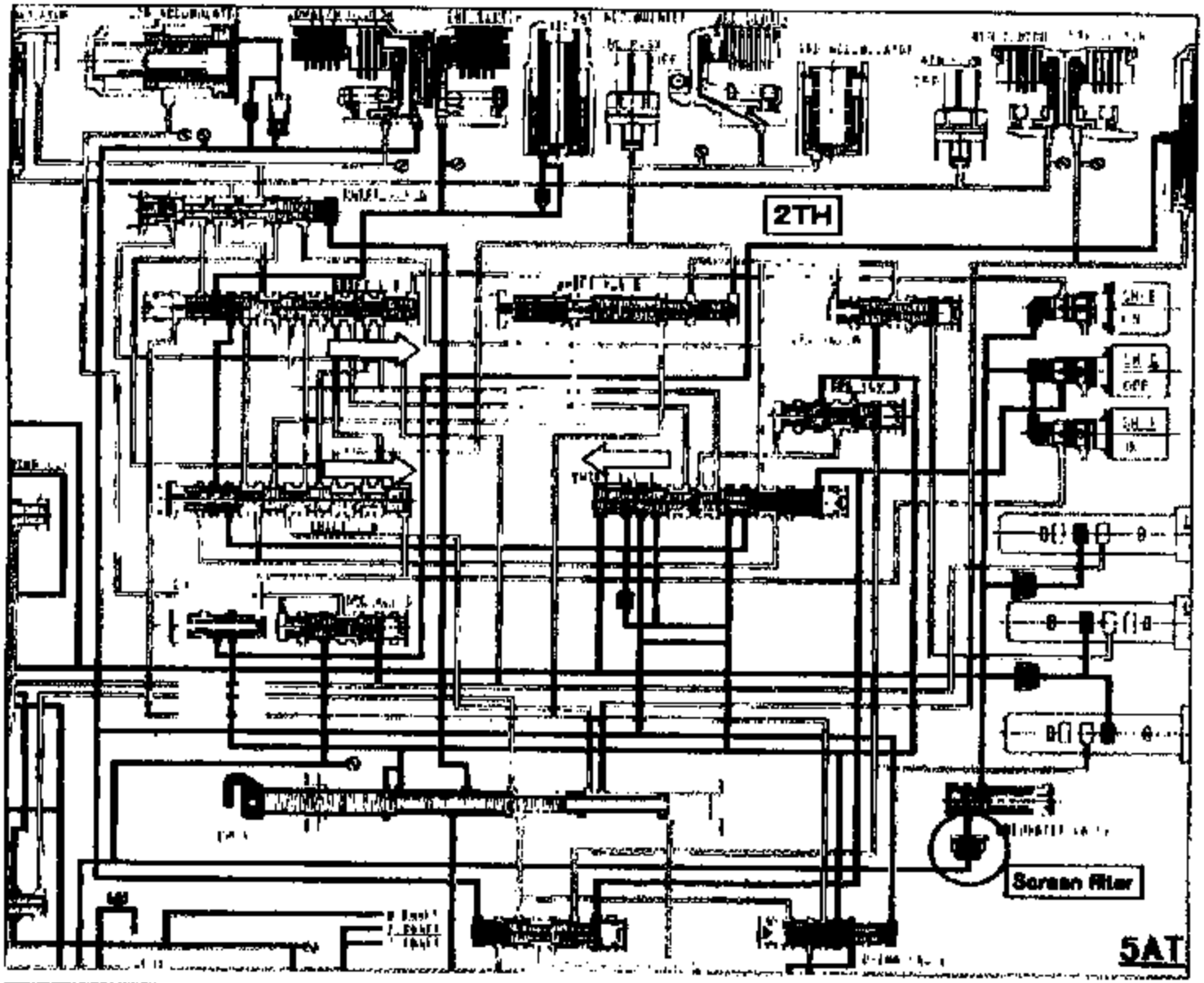
3. 5TH Hydraulic circuit



※The MOD pressure in 5TH normal hydraulic circuit is.
-Shift valve B. C is turning on. ➡ -Shift valve A is turning off. ⇨

Mission #8027653 EMCS DATA ANALYSIS CON'T

4. 2ND Hydraulic circuit



※ Shift valves A.B.C are being turned off to the MOD pressure in 2ND normal hydraulic circuit.

Mission #8027653 EMCS DATA ANALYSIS

CONCLUSION

Result

•When ATF strainer and each filter is blocked due to the wear of 3rd clutch causing contamination through out mission. The PL(MOD) pressure decreases due to the state of the hydraulic circuit on 5TH. Shift valves A,B,C enters the state of turning off this becomes 2ND hydraulic circuit. Result arrives at the incident of 5-2 kick down.

G - FORCE & PRESSURE COMPARISON CHART

G-FORCE CHART				
ATM #	CONDITION	NORMAL G	SUDDEN DOWN SHIFT	NVH SHIFT RATING
ATM # 8027653	5-2KD	0.1G @ 55MPH MAX	.75G @ 60 MPH	5.5
ATM # 9041539	4-2KD	0.1G @ 55MPH MAX	.6 G @ 60 MPH at Fail Safe	5.5
ATM # 8008953	4-2KD	0.1G @ 55MPH MAX	1.23G @ 60 MPH at Fail Safe	5.5

PRESSURE COMPARISON				
ITEM	NORMAL	ACTUAL		
		ATM # 8027653	ATM # 9041539	ATM # 8008953
MODULATOR PRESSURE	6.5 kgf 60-80^{0}C	1 kgf @ 120^{0}C 55 MPH	2 kgf @ 125^{0}C 55 MPH	No Data due to Repeated Fail Safe Mode
PL (LINE PRESSURE)	9.25~9.75kgf 60-80^{0}C	1 kgf @ 120^{0}C 55MPH	2 kgf @ 125^{0}C 55 MPH	
SHIFT SOLENOID SIGNAL(A,B,C)	ON/OFF/ON	ON/OFF/ON	ON/OFF/ON	ON/OFF/ON

Mission #9041539 EMCS DATA ANALYSIS

[redacted]

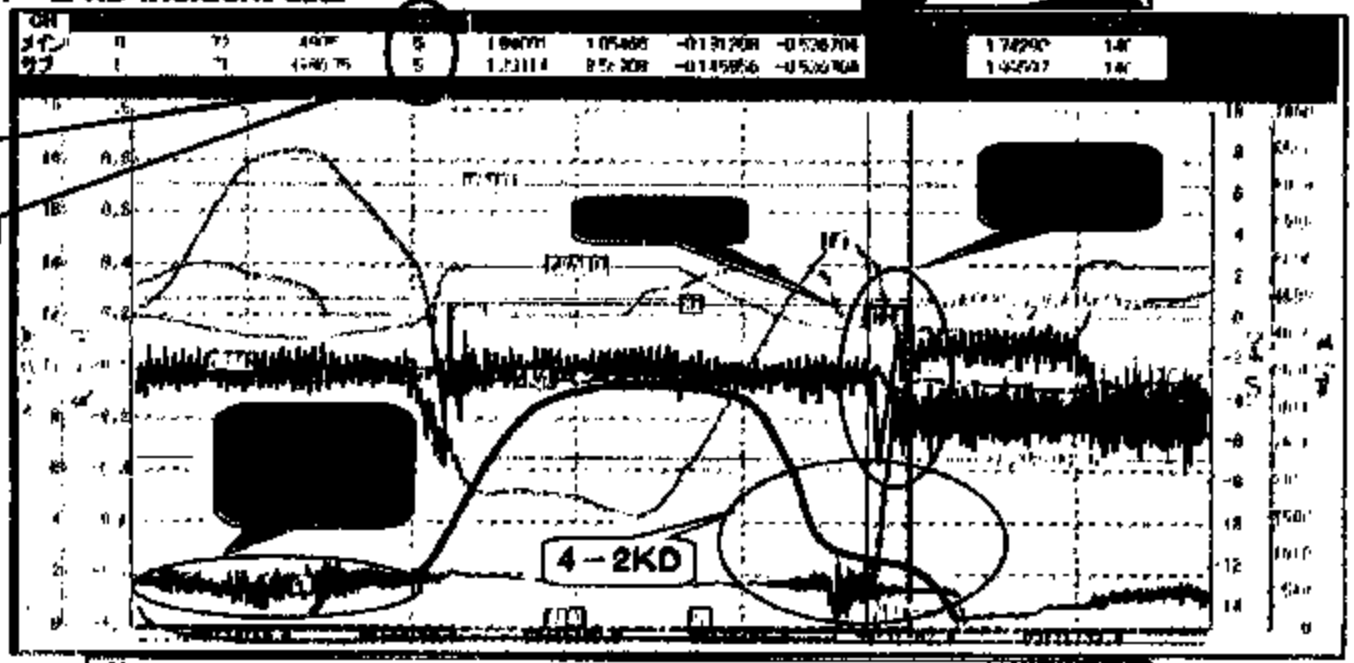
1. Incident generation process
   - ①. 3rd clutch wear and facing material peeling off
   - ②. ATF strainer blocked & breakage
   - ③. Each screen filter blocking
   - ④. Line pressure decrease because of filter blocking
   - ⑤. 4-2 KD generation

(ATF Strainer)

(Screen filter)

2. 4－2 KD Incident data

ECU Shift Signal is Position 5 while mission engages 4-2 KD. This action is Characteristic of fail safe mode.



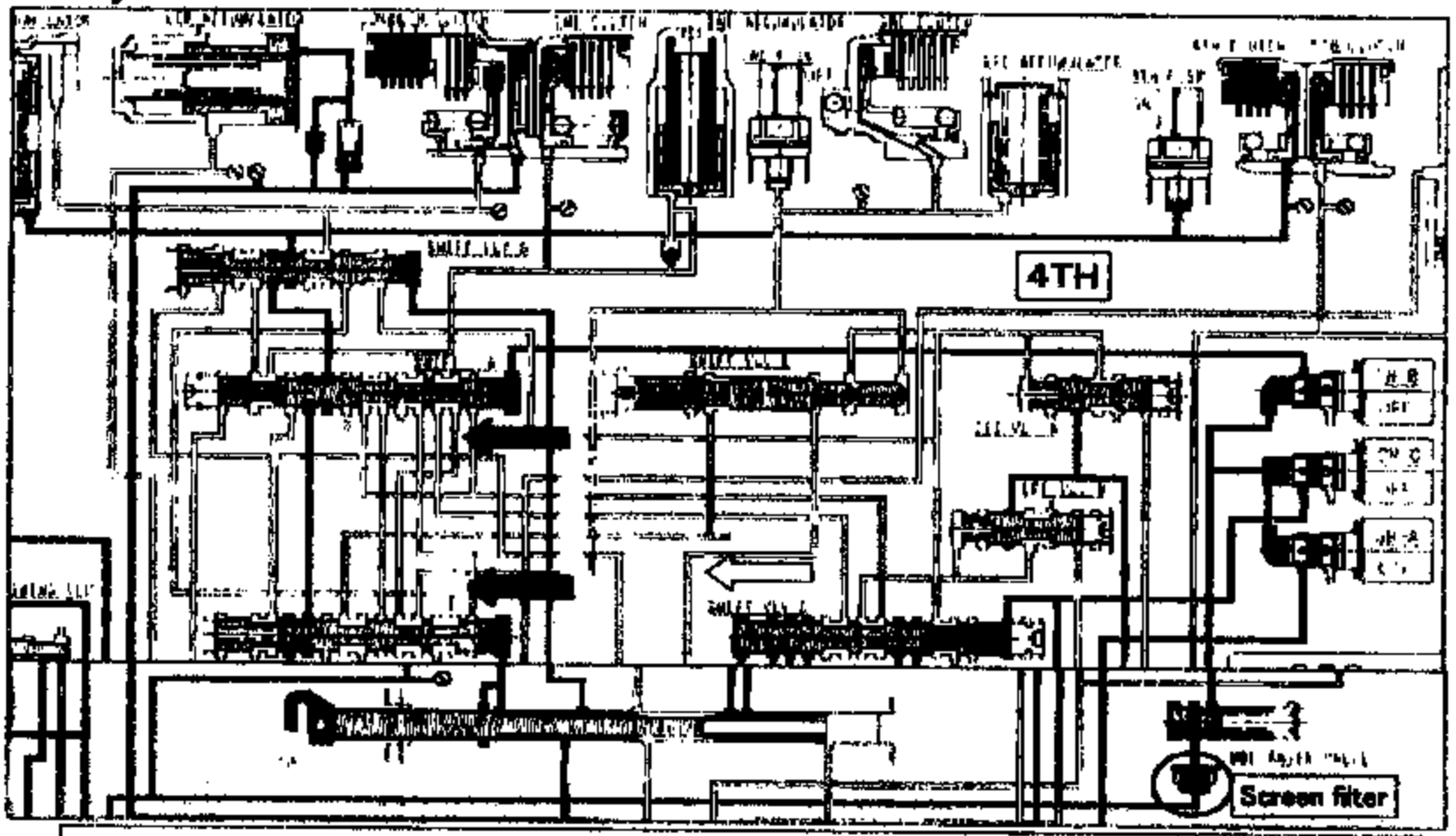
※ 4－2 KD are generated by the PL(MOD) pressure decrease, the shift shock of 0.8G is generated.

NOTE: Due to ECU entering fail safe mode repeatedly 4-2 KD Data captured only.

FAIL SAFE MODE: ECU detects mechanical failure and overrides normal shift pattern.

Mission #9041539 EMCS DATA ANALYSIS CON'T.

3. 4TH Hydraulic circuit



※The MOD pressure in 4TH normal hydraulic circuit is、
・Shift valve A. B is turning on. ➡ ・Shift valve C is turning off. ⇨

Mission #9041539 EMCS DATA ANALYSIS

CONCLUSION

Result

•When ATF strainer and each filter is blocked due to the wear of 3rd clutch causing contamination through out mission. The PL(MOD) pressure decreases due to the state of the hydraulic circuit on 5TH. Shift valves A,B,C enters the state of turning off this becomes 2ND hydraulic circuit. Result arrives at the incident of 5-2 kick down.

SURFACE ROUGHNESS
&
DISK WEAR DATA

Original 3rd Clutch Surface Roughness and Plate Thickness Data Summary

Average	ATM # 8027653	ATM # 8008953	ATM # 9041539
Ra (New STD .50 max)	**0.355**	**0.52**	**0.415**
Rp (New STD .85 max)	**2.73**	**1.86**	**0.274**
Rpm	1.2	1.42	1.96
Rmax	9.04	7.19	5.64

Nominal disk wear allowed per PED/FDD test is .100mm/disk
Total .500mm/Clutch

ATM# 8027653 — Disk Thickness 1.94 +/- 0.06

									CLEARANCE JUDGE	
3rd	Disk Thickness (INNER)	1.768	1.267	1.218	1.242	1.212		NG	STD: 0.7 -0.9	NG
	Disk Thickness (OUTER)	1.646	1.256	1.224	1.368	1.206		NG	ACT: .213mm	
	PLATE THICKNESS									

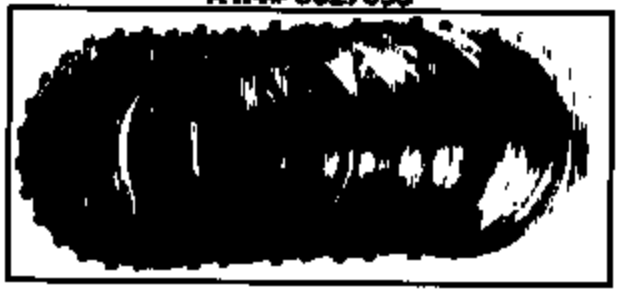
ATM# 8008953 — Disk Thickness 1.94 +/- 0.06

3rd	Disk Thickness (INNER)	1.641	1.452	1.224	1.227	1.265		NG	STD: 0.7 -0.9	NG
	Disk Thickness (OUTER)	1.653	1.332	1.235	1.204	1.431		NG	ACT: .275	
	PLATE THICKNESS									

ATM # 9041539 — Disk Thickness 1.94 +/- 0.06

3rd	Disk Thickness (INNER)	1.469	1.207	1.217	1.208	1.197		NG	STD: 0.7 -0.9	NG
	Disk Thickness (OUTER)	1.433	1.197	1.214	1.201	1.197		NG	ACT: .215	
	PLATE THICKNESS									

ATM# 8027653



ATM# 8008953

ATM # 9041539

NOTE: Roughness data taken from one to two plates per clutch due to wear and burning.

DETAILED MISSION ANALYSIS

ATM # B7WA-9041539
MODEL 01 ACURA TL
MILEAGE 23,911

Disk Thickness 1.94 +/- 0.06
Plate Thickness 2.3mm

Clutch		E/P Side Disk 1	Disk 2	Disk 3	Disk 4	Piston Side Disk 5	Disk 6	THICKNESS JUDGE	CLEARANCE JUDGE	
1st										
2nd									STD: .85-1.05 ACT: 1.25	NG
3rd	Disk Thickness (INNER)	1.469	1.207	1.217	1.208	1.197		NG	STD: 0.7 -0.9 ACT: .215	NG
	Disk Thickness (OUTER)	1.433	1.197	1.214	1.201	1.197		NG		
	PLATE THICKNESS									
4th									STD: 0.55 - .75mm	

FAILED 3RD CLUTCH

HIGH HEAT & WEAR 4TH CLUTCH

SUMMARY

*Surface Roughness data indicates an OK Ra value of .415 if .50 Ra becomes new standard.
*Rp value of .274 indicates OK RP value if .85 RP becomes new standard. **Note**: This is a one plate measurement.
*Failed 3rd clutch disks 1 - 6 have no facing material. This is evidence of metal to metal contact.
*4th clutch wear possible due to fail safe mode driving. 2nd and 4th are only available in safe mode thus generating heat wear.
*4th clutch clearance unable to check due high heat condition. Unable to remove gear from clutch.

ATM # B7WA-8027653
MODEL 01 ACURA TL
MILEAGE 32,595

Disk Thickness 1.94 +/- 0.06
Plate Thickness 2.3mm

Clutch		E/P Side Disk 1	Disk 2	Disk 3	Disk 4	Piston Side Disk 5	Disk 6	THICKNESS JUDGE	CLEARANCE JUDGE	
1st										
2nd									STD: .85-1.05 ACT: 1.00mm	OK
3rd	Disk Thickness (INNER)	1.768	1.267	1.218	1.242	1.212		NG	STD: 0.7 -0.9 ACT: .213mm	NG
	Disk Thickness (OUTER)	1.646	1.256	1.224	1.368	1.206		NG		
	PLATE THICKNESS									
4th									STD: 0.55 - .75mm ACT: 1.10mm	NG

FAILED 3RD CLUTCH

SUMMARY

*Surface Roughness data indicates good RA value of .335 if .50 max becomes new standard.

*Rp value of 2.73 indicates NG RP value If .85 RP becomes new standard.

*Failed 3rd clutch disks 1,2,3 have no facing material. This is evidence of metal to metal contact.

ATM # B7WA-8008953
MODEL 01 ACURA TL
MILEAGE 22,816

Disk Thickness 1.94 +/- 0.06
Plate Thickness 2.3mm

Clutch		E/P Side Disk 1	Disk 2	Disk 3	Disk 4	Piston Side Disk 5	Disk 6	THICKNESS JUDGE	CLEARANCE JUDGE	
1st										
2nd									STD: .85-1.05 ACT: 1.00	OK
3rd	Disk Thickness (INNER)	1.641	1.452	1.224	1.227	1.265		NG NG	STD: 0.7 -0.9 ACT: .275	NG
	Disk Thickness (OUTER)	1.653	1.332	1.235	1.204	1.431				
	PLATE THICKNESS									
4th									STD: 0.55 - .75mm 0.790	NG

FAILED 3RD CLUTCH

WORN 4TH CLUTCH (B2)

SUMMARY

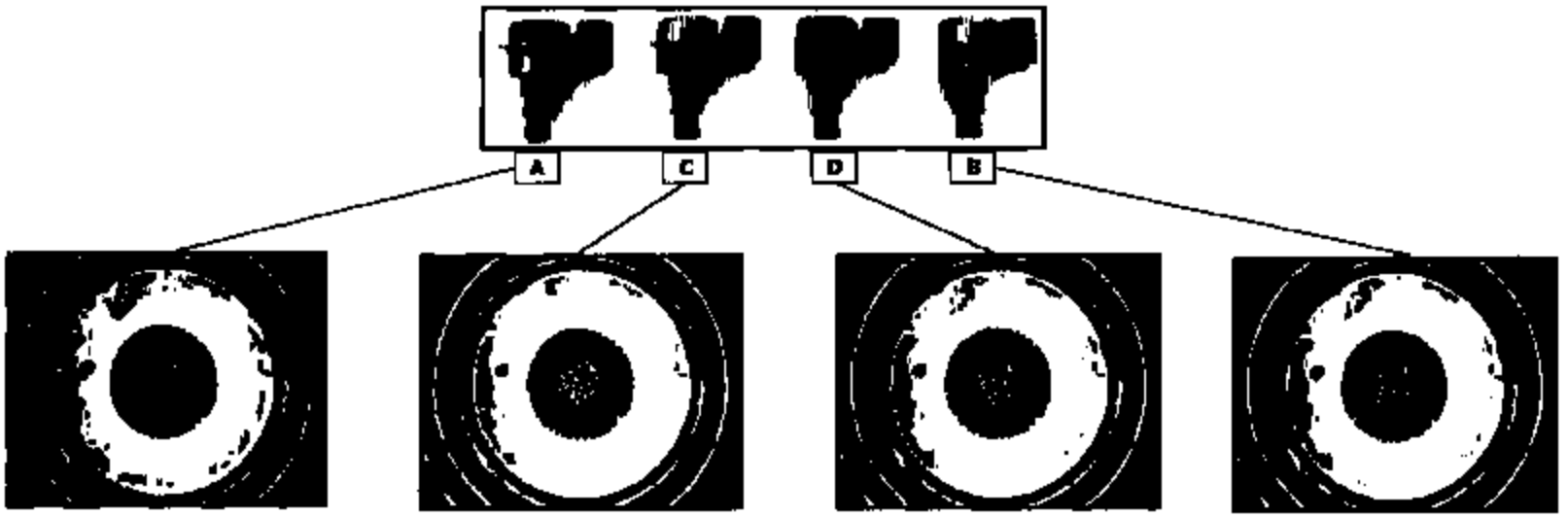
*Surface Roughness data indicates an NG Ra value of .520 if .50 Ra becomes new standard.
*Rp value of 2.83 indicates OK RP value if .85 RP becomes new standard. **Note:** This is a two plate measurement.
*Failed 3rd clutch disks 2,3,4 have no facing material. This is evidence of metal to metal contact.
*4th clutch wear possible due to fail safe mode driving. 2nd and 4th are only avaliable in safe mode thus generating heat wear.

MISSION COMPONENT FAILURE

5AT SHIFT S[illegible]ID SCREENS

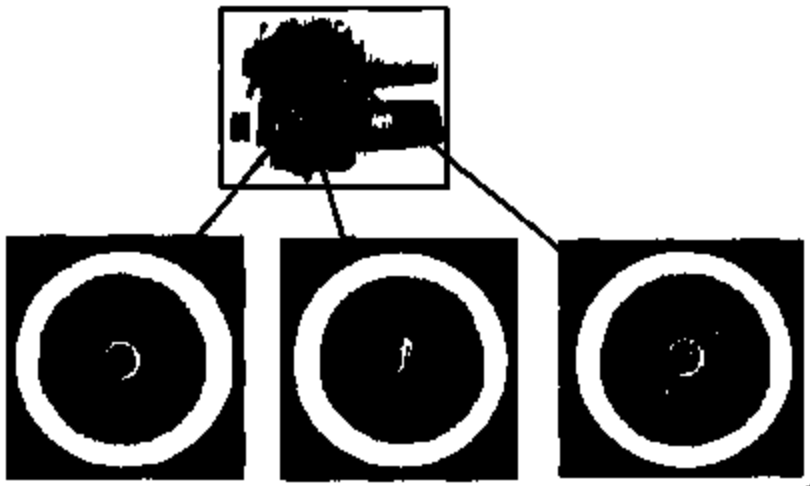
ATM# B7WA-8008953

MILEAGE: 22,896



*Disassembly revealed no contamination - NTF -

5AT LINEAR SOLENOIDS



Linear Solenoid A & B screens

Linear Solenoid C

Note: Component failure similar in three missions analyzed.

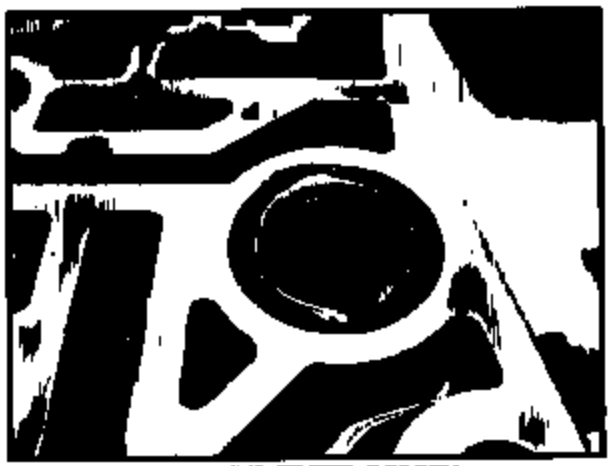
*Disassembly revealed contamination - NG -
*Modulator pressure to the solenoids restricted

REGULATOR & MAIN VALVE BODY SCREEN FAILURES

* MVB filter forced through seperater plate.

RVB SEPERATER PLATE

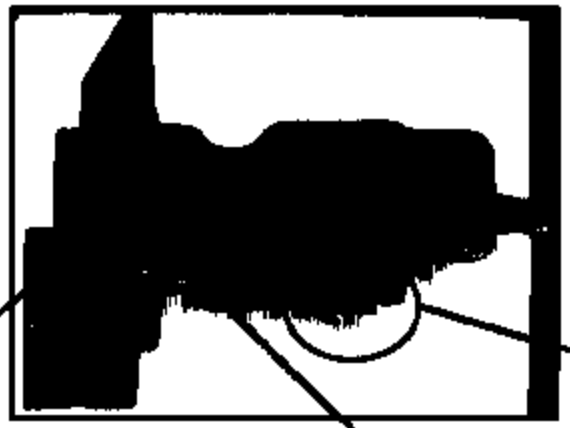
*Disassembly revealed contamination - NG -

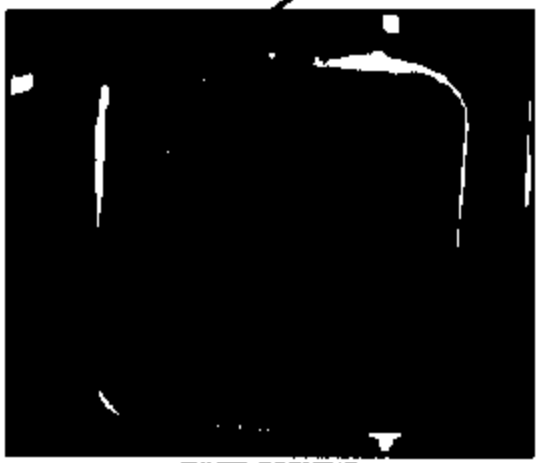


MVB FILTER SCREEN

Note: Component failure similar in three missions analyzed.

5AT STRAINER FAILURE





INLET OPENING

INLET OPENING

OUTLET OPENING

*Disassembly revealed contamination and deterioration - NG -

Note: Component failure similar in three missions analyzed.

Analysis Results NHTSA Hotline Missions

Disassembly Analysis Results

VIN: 19UYA42601A[redacted]
Model: 01m CL Sport
Mission #: BGFA-1018720
Mission Build Date:10/4/00
Contention:Won't shift

1.) 3rd Clutch burning was the root cause of this failure.
2.) Contamination from 3rd clutch friction material clogged the ATF strainer causing it to fail,allowing contamination to enter the hydraulic control circuits.
3.) All 3 secondary screen filters in the modulator pressure circuit were contaminated with clutch friction material.
4.) Visual inspection of gears did not reveal any damage.
5.) Oil Pump had free rotation, did not show evidence of seizure.
6.) 1st Gear one way over running clutch had smooth rotation and visually did not show signs of seizure.
7.) None of the other clutches failed, however 2nd,4th, and 5th clutches had plates discolored from heat generated from clutch slip.

BGFA 018720

1st/1st Hold clutch

Low gear OWC/
over running clutch

Clearance: 1.52mm
Condition: A1

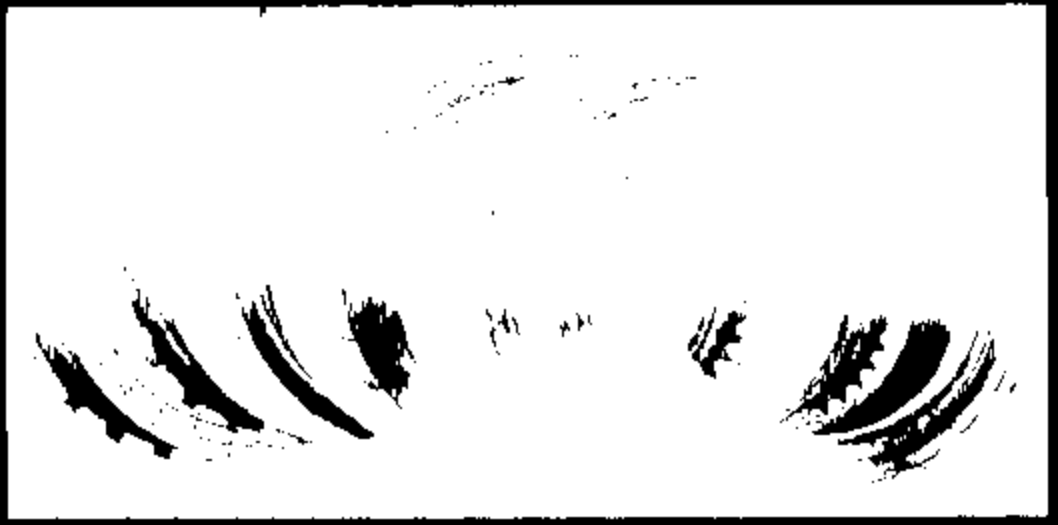
Sprag condition: OK
Inner/outer race condition: OK

BGFA-1018720

2nd Clutch

Clearance: 1.42mm
Condition: B1

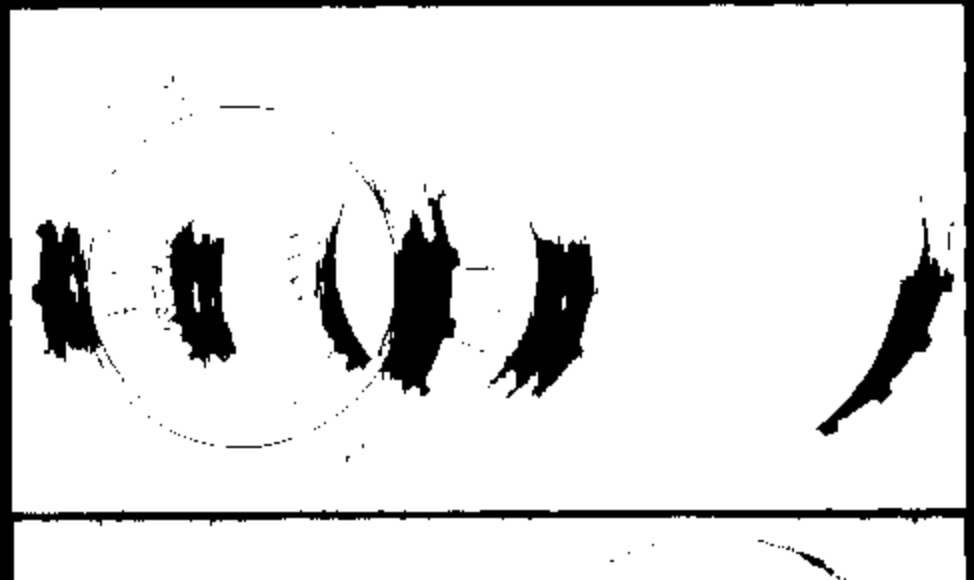
3rd Clutch

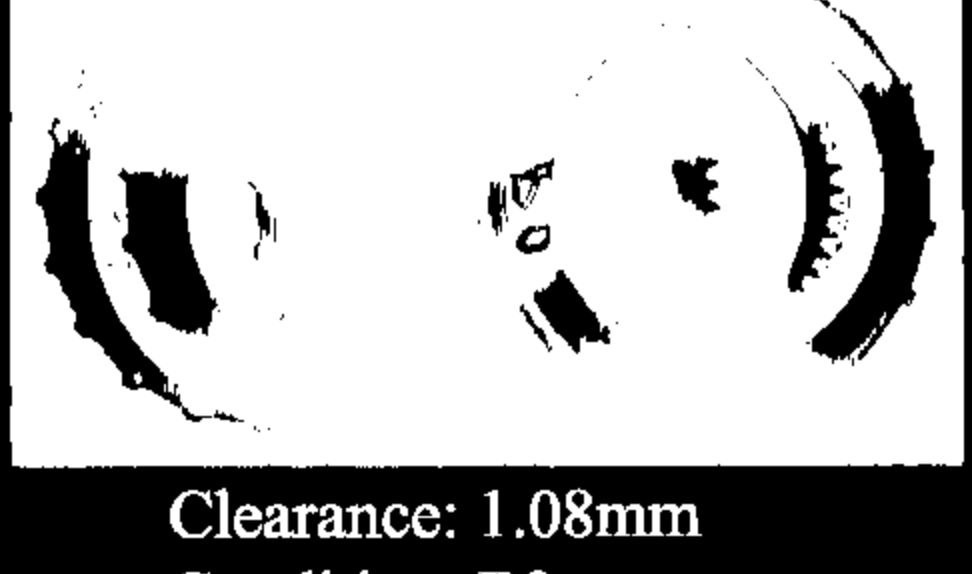


Clearance: 3.25mm
Condition: C2

BGFA-1018720

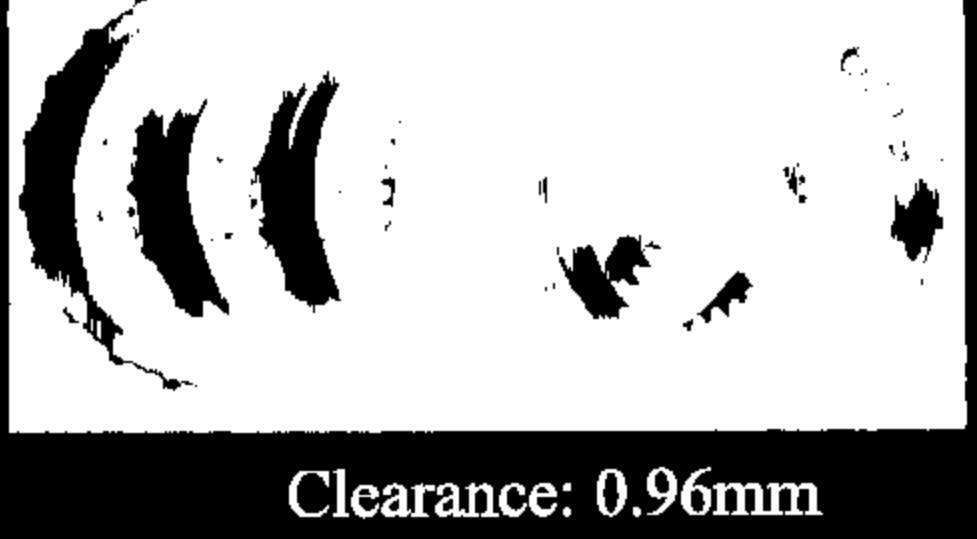
4th Clutch





Clearance: 1.08mm
Condition: B2

5th Clutch



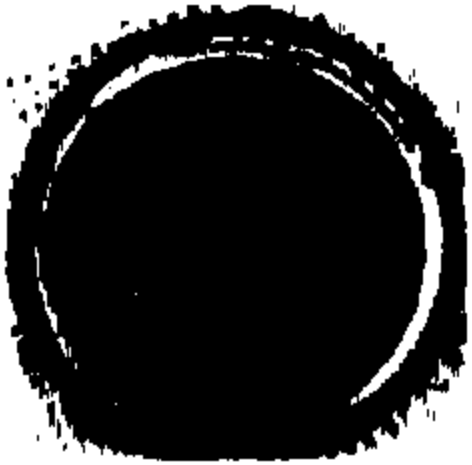
Clearance: 0.96mm
Condition: B1

BGFA-1018720 Strainer/Filter condition

Strainer failed at edge and ring

Lin. Sol. A

Lin. Sol.
Mod. Pressure in



Modulator Circuit Filter
(Before mod valve)

Modulator Circuit Filter
(after Mod valve
Before linear solenoid)

Lin. Sol. B

Oil Pump OK, no
seizure

Disassembly Analysis Results

VIN: 19UYA42691A[redacted]
Model: 01m CL Sport
Mission #: BGFA-1018818
Mission Build Date:10/4/00
Contention:Shifts hard on take off, will not shift from 2nd to 3rd just revs

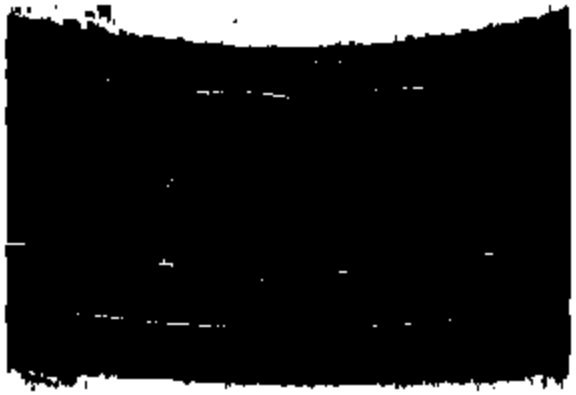
1.) 3rd Clutch burning was the root cause of this failure.
2.) Contamination from 3rd clutch friction material clogged the ATF strainer causing it to fail,allowing contamination to enter the hydraulic control circuits.
3.) All 3 secondary screen filters in the modulator pressure circuit were contaminated with clutch friction material.
4.) Visual inspection of gears did not reveal any damage.
5.) Oil Pump had free rotation, did not show evidence of seizure.
6.) 1st Gear one way over running clutch had smooth rotation and visually did not show signs of seizure.
7.) 4th and 5th clutches had failed also, 4th clutch friction disks were seized to the gear spline area. Appears customer drove vehicle for extended time with clutch slip.

BGFA 018818

1st/1st Hold clutch

Clearance: 1.52mm
Condition: B1

Low gear OWC/
over running clutch



Sprag condition: OK
Inner/outer race condition: OK

BGFA-1018818

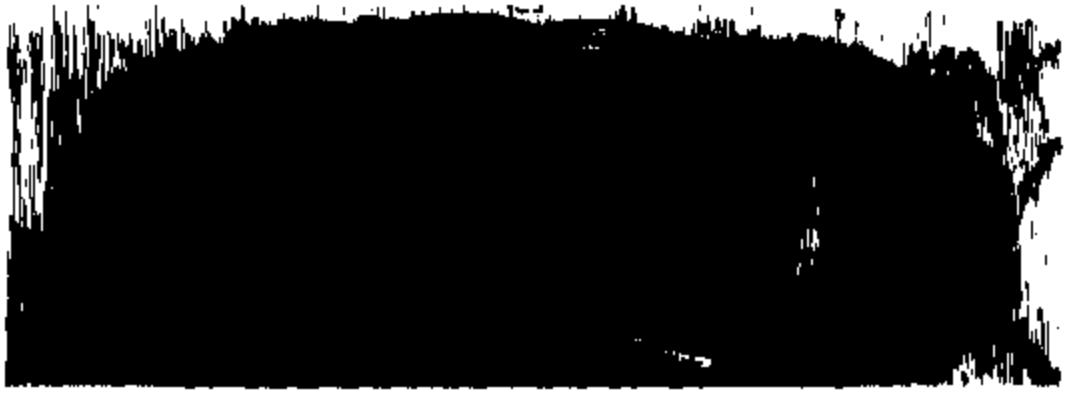
2nd Clutch

Clearance: 1.35mm
Condition: B1

3rd Clutch

Clearance: N/A
Condition: C2

4th Clutch



Clearance:N/A
Condition: C2
Note: Friction disks were seized to gear splines

5th Clutch

Clearance: N/A
Condition: C2

BGFA-1018818 Strainer/Filter condition

Strainer failed at edge and ring

Modulator Circuit Filter
(Before mod valve)

Modulator Circuit Filter
(after Mod valve
Before linear solenoid)

Lin. Sol. A

Lin. Sol.
Mod. Pressure in
Oil Pump OK, no
seizure

Lin. Sol. B

Disassembly Analysis Results

VIN: 19UUA56701A[redacted]
Model: 01m TL
Mission #: B7WA-8014113
Mission Build Date:10/24/00
Contention:Hard shift, jerks

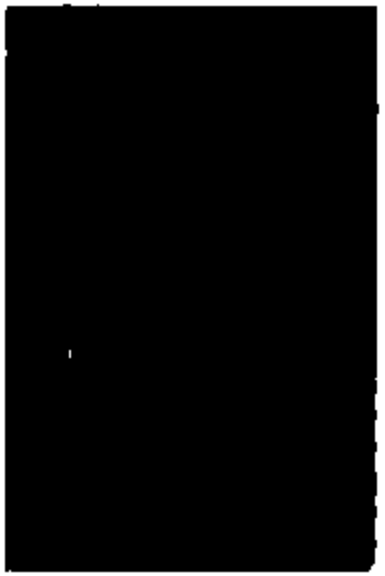
1.) 3rd Clutch burning was the root cause of this failure.
2.) Contamination from 3rd clutch friction material clogged the ATF strainer causing it to fail,allowing contamination to enter the hydraulic control circuits.
3.) All 3 secondary screen filters in the modulator pressure circuit were contaminated with clutch friction material.
4.) Visual inspection of gears did not reveal any damage.
5.) Oil Pump had free rotation, did not show evidence of seizure.
6.) 1st Gear one way over running clutch had smooth rotation and visually did not show signs of seizure.
7.) None of the other clutches failed, however 4th, and 5th clutches had plates discolored from heat generated from clutch slip.

B7WA-8014113

1st/1st Hold clutch

Clearance: 1.35mm
Condition: A2

Low gear OWC/
over running clutch



Sprag condition: OK
Inner/outer race condition: OK

B7WA-8014113

2nd Clutch

Clearance: 1.05mm
Condition: A2

3rd Clutch

Clearance: N/A
Condition: C2

B7WA-8014113

4th Clutch

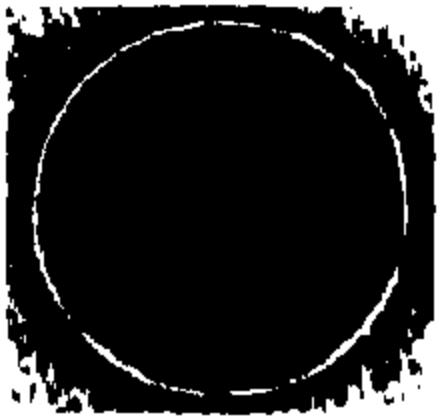
Clearance: 1.02mm
Condition: B1

5th Clutch

Clearance: 0.85mm
Condition: B1

B7WA-8014113 Strainer/Filter condition

Strainer failed at edge and ring



Modulator Circuit Filter
(Before mod valve)

Modulator Circuit Filter
(after Mod valve
Before linear solenoid)

Lin. Sol. A

Lin. Sol.
Mod. Pressure in
Oil Pump OK, no seizure

Lin. Sol. B

Disassembly Analysis Results

VIN: 19UUA56631A[redacted]
Model: 01m TL
Mission #: B7WA-8025514
Mission Build Date:12/12/00
Contention:Slips 2-3

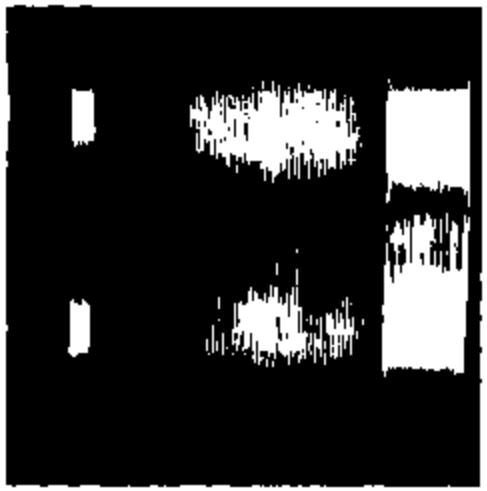
1.) 3rd Clutch burning was the root cause of this failure.
2.) Contamination from 3rd clutch friction material clogged the ATF strainer causing it to fail,allowing contamination to enter the hydraulic control circuits.
3.) All 3 secondary screen filters in the modulator pressure circuit were contaminated with clutch friction material.
4.) Visual inspection of gears did not reveal any damage.
5.) Oil Pump had free rotation, did not show evidence of seizure.
6.) 1st Gear one way over running clutch had smooth rotation and visually did not show signs of seizure.
7.) None of the other clutches failed, all were A1/A2 condition, appears customer did not drive vehicle for long after slipping was noticed.

B7WA[redacted]8025514

1st/1st Hold clutch

Clearance: 1.28mm
Condition: A1

Low gear OWC/ over running clutch



Sprag condition: OK
Inner/outer race condition: OK

B7WA-8025514

2nd Clutch

Clearance: 1.01mm
Condition: A2

3rd Clutch

Clearance: N/A
Condition: C2

B7WA-8025514

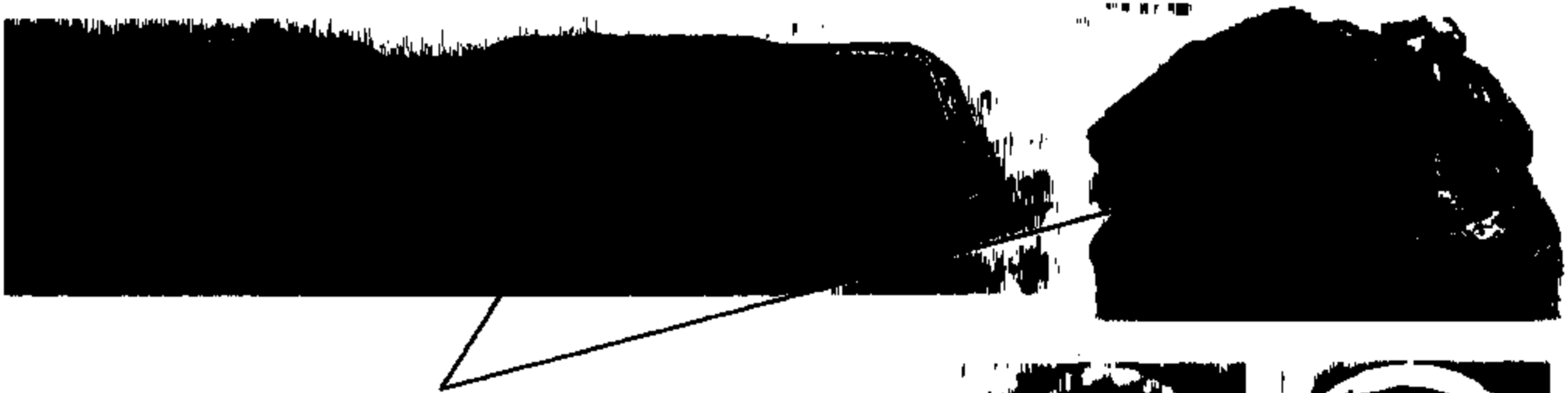
4th Clutch

Clearance: 0.88
Condition: A2

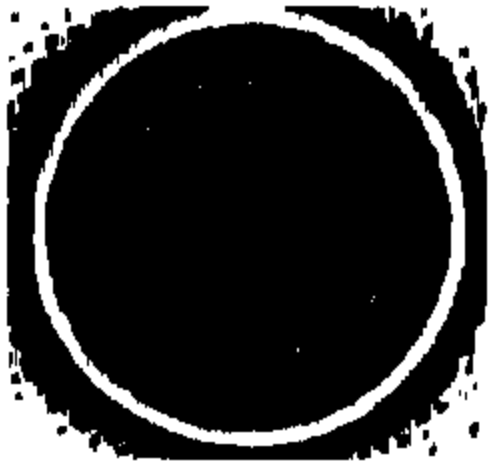
5th Clutch

Clearance: 0.98mm
Condition: A2

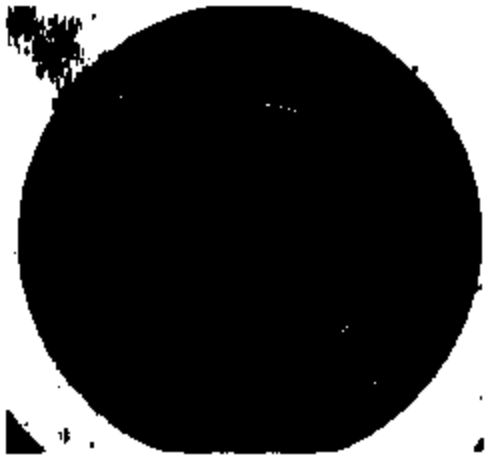
B7WA-8025514 Strainer/Filter condition



Strainer did not fail around the side, failure did occur at the ring.



Modulator Circuit Filter (Before mod valve)



Modulator Circuit Filter (after Mod valve Before linear solenoid)

Lin. Sol. A

Lin. Sol. Mod. Pressure in

Lin. Sol. B

Oil Pump OK, no seizure

Disassembly Analysis Results

VIN: 19UUA56972A[redacted]
Model: 02m TL/S
Mission #: B7WA-9059518
Mission Build Date:11/6/01
Contention:Will not downshift, slips in all gears

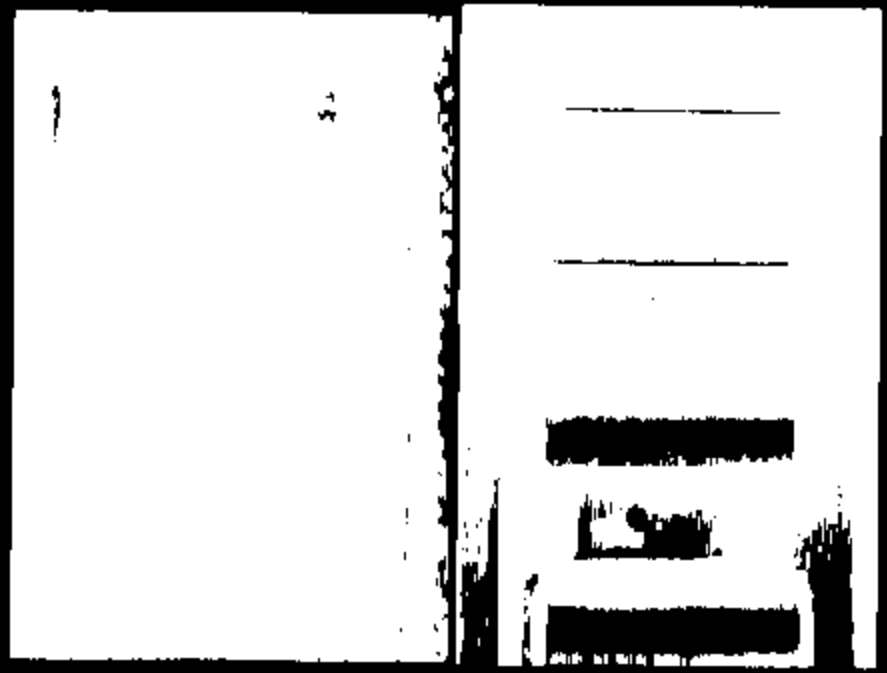
1.) 3rd Clutch burning was the root cause of this failure.
2.) Contamination from 3rd clutch friction material clogged the ATF strainer causing it to fail,allowing contamination to enter the hydraulic control circuits.
3.) All 3 secondary screen filters in the modulator pressure circuit were contaminated with clutch friction material. The filter before the modulator valve was almost completely blocked causing low modulator pressure and sudden downshift to 2nd gear.
4.) Visual inspection of gears did not reveal any damage.
5.) Oil Pump had free rotation, did not show evidence of seizure.
6.) 1st Gear one way over running clutch had smooth rotation and visually did not show signs of seizure.
7.) None of the other clutches failed, all were A1-B1 condition, appears customer did not drive vehicle for long after slipping was noticed.

B7WA 0059518

1st/1st Hold clutch

Clearance: 1.40mm
Condition: A1

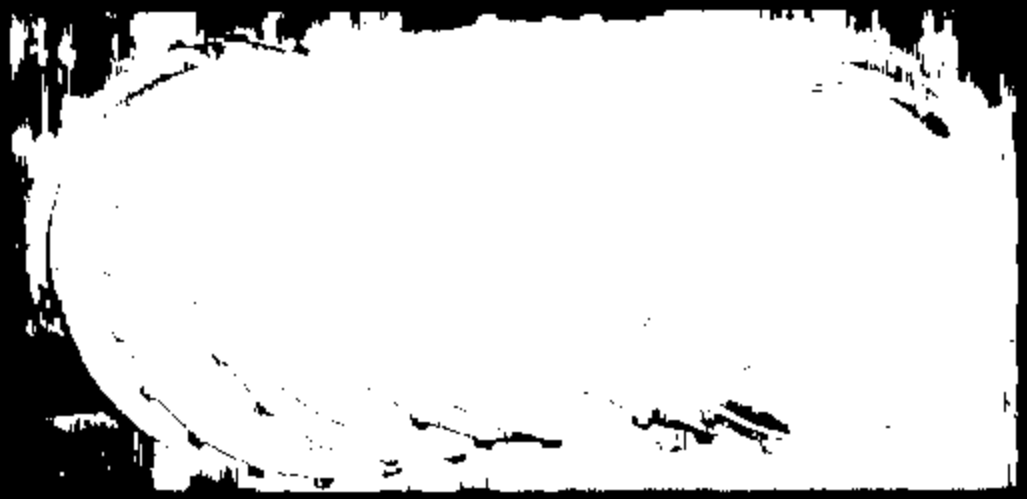
Low gear OWC/
over running clutch



Sprag condition: OK
Inner/outer race condition: OK

B7WA-9059518

2nd Clutch



Clearance: 1.15mm
Condition: A2

3rd Clutch

Clearance: 3.90mm
Condition: C2

B7WA-9059518

4th Clutch

Clearance: 1.16mm
Condition: B1

5th Clutch

Clearance: 1.05mm
Condition: B1

B7WA-9059518 Strainer/Filter condition

Strainer did not fail around the side, failure did occur at the ring.

Modulator Circuit Filter
(Before mod valve)

Modulator Circuit Filter
(after Mod valve
Before linear solenoid)

Lin. Sol. A

Lin. Sol.
Mod. Pressure in

Lin. Sol. B

Oil Pump OK, no seizure

Automatic Transmission Problem

Honda R&D Co., Ltd.

OCT/31/2002

3RD Clutch Problem

■Customer complaints

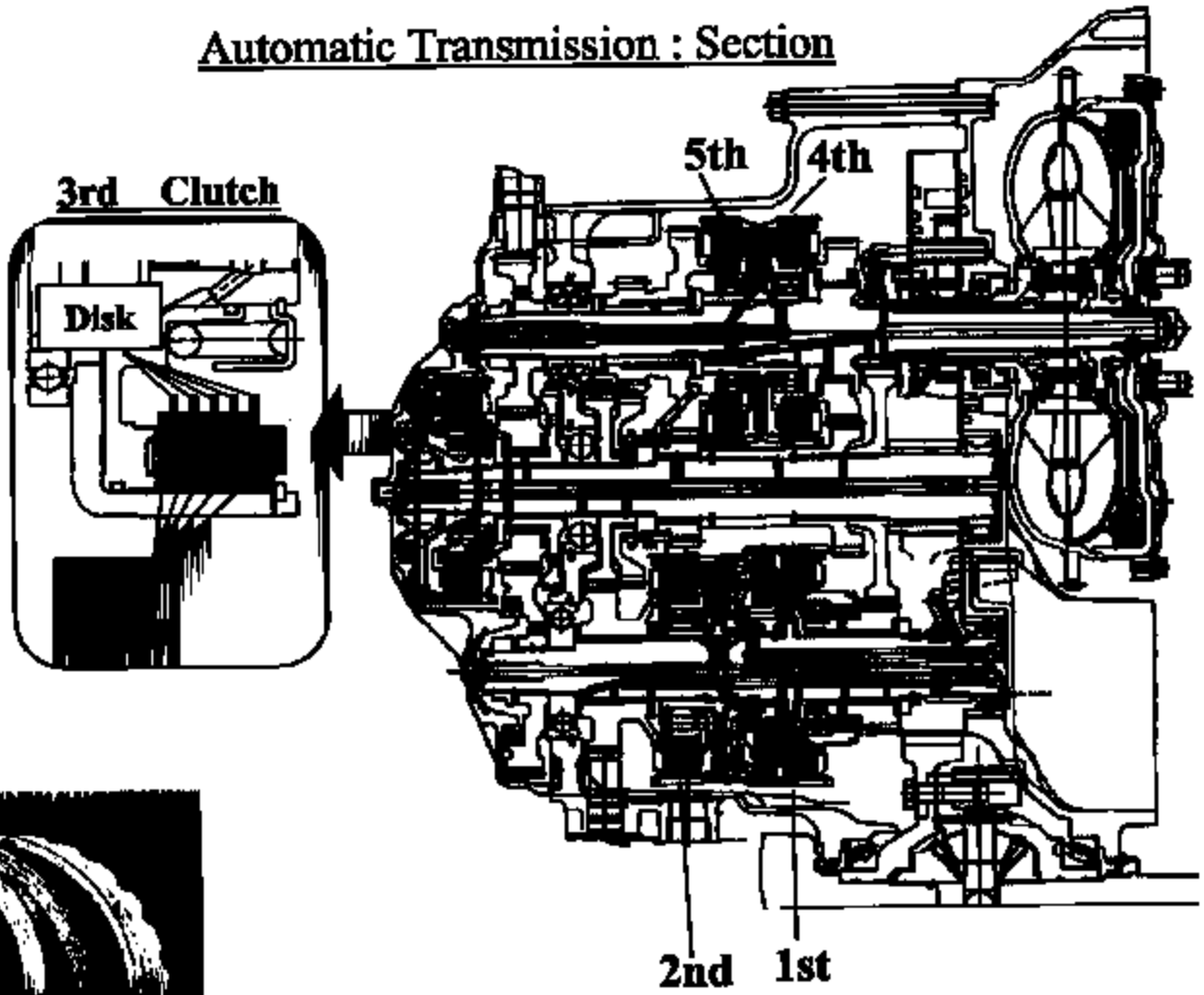
- 2-3 upshift flare
- 2-3 upshift judder
- No 3rd gear

Downshift to 2nd may occur when the above symptoms exist.

■Cause

An abnormal wear of the 3rd clutch

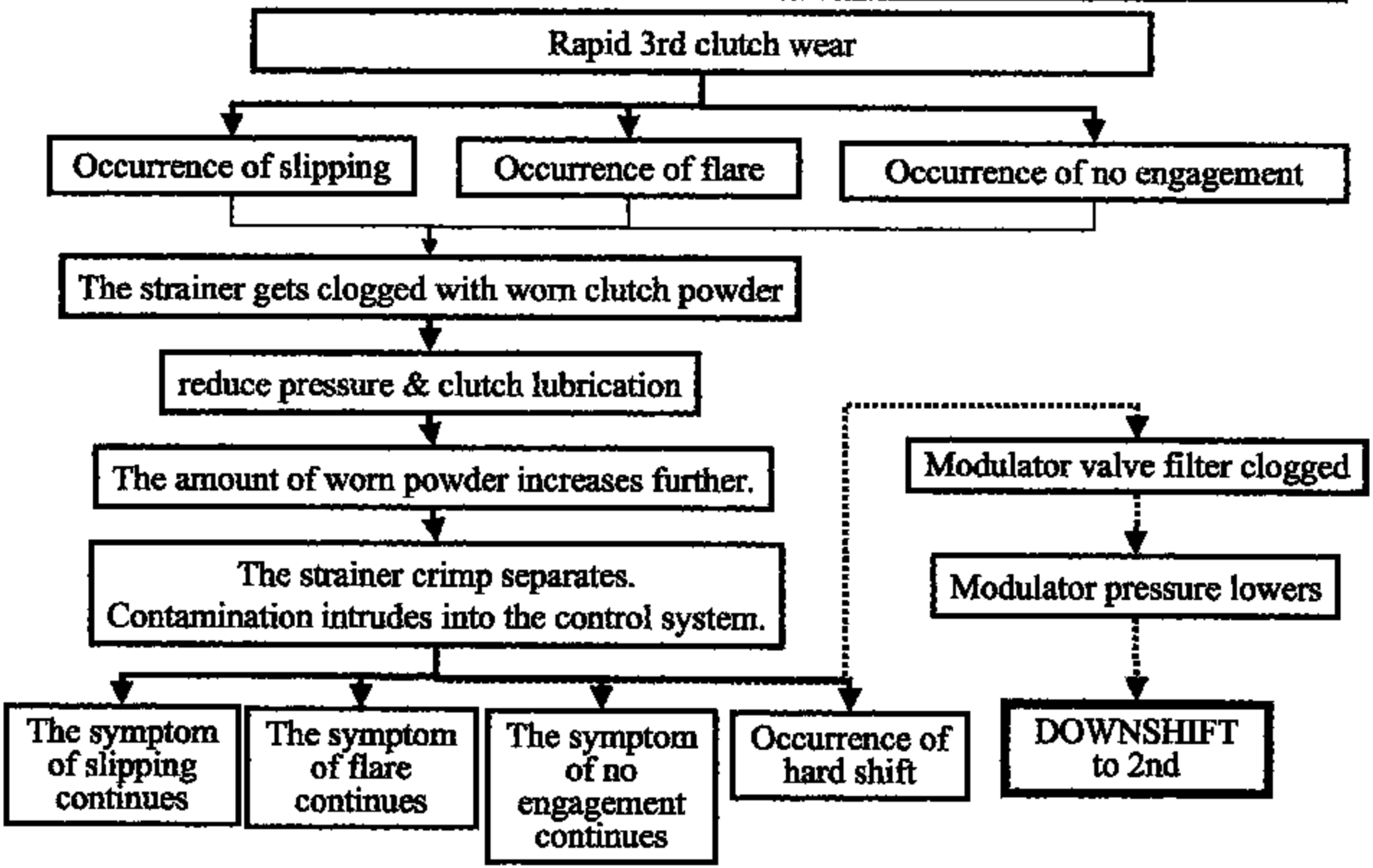
Automatic Transmission : Section



Failed part (3rd clutch)

The disks are worn abnormally.

Mechanism

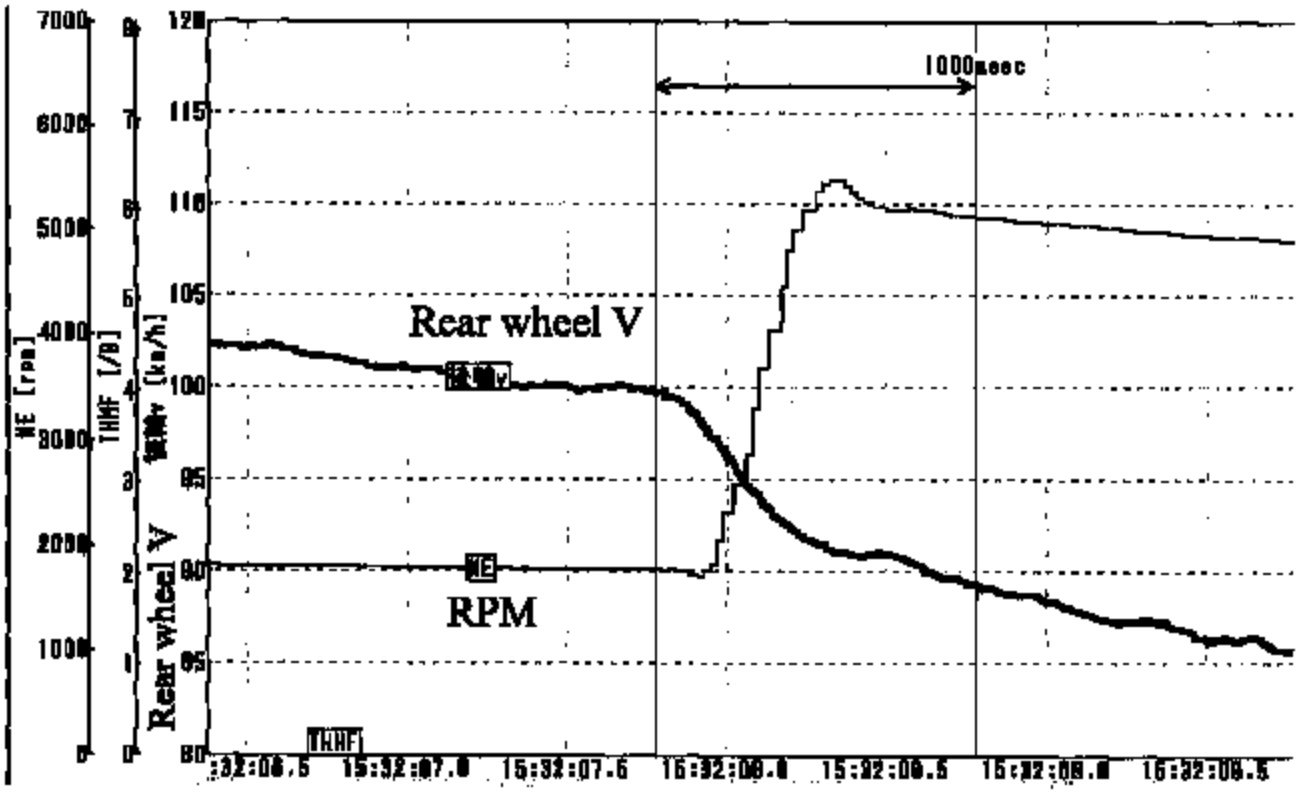


*** Modulator pressure: Downshifting occurs when the base pressure of the solenoid valve lowers below the value set by spec.**

Change of the vehicle speed : Representative data sample①

Vehicle V = Actual measurement data at the time of 5-2 downshift at about 65 mile/h

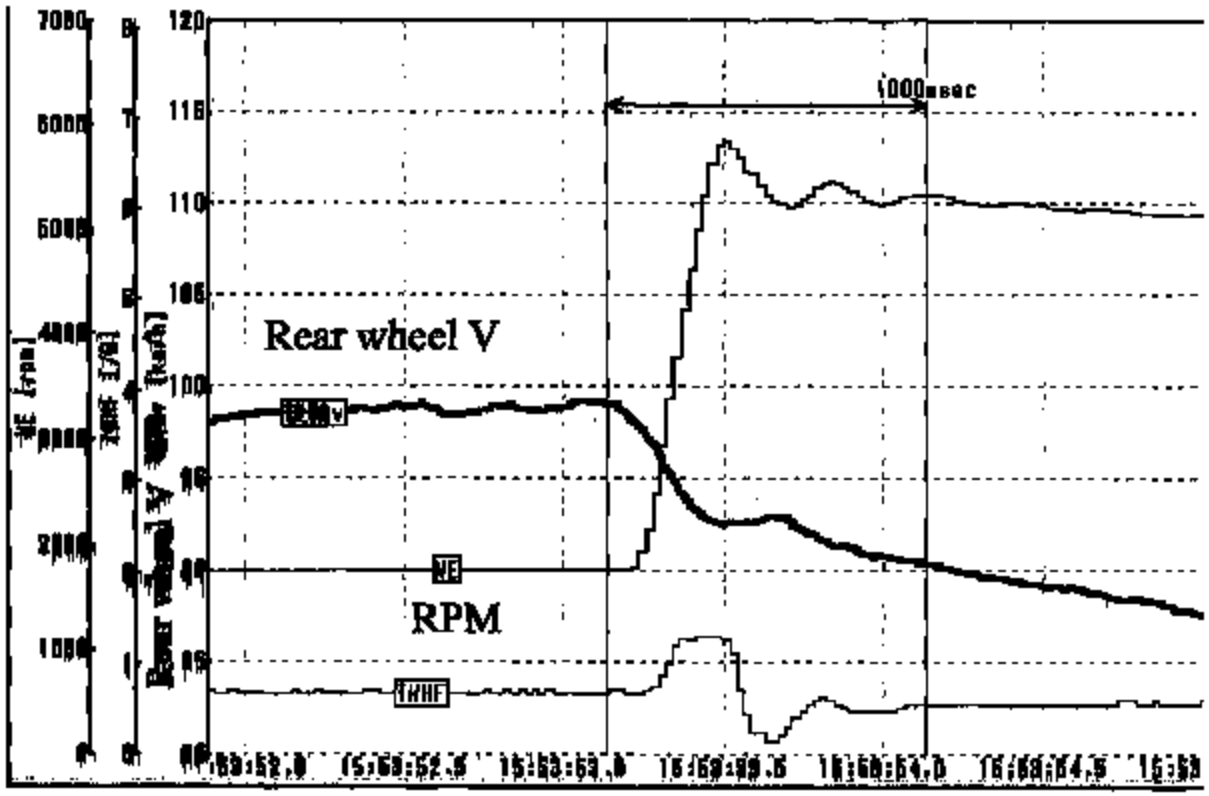
Close Throttle



Change of the vehicle speed : Representative data sample ②

Vehicle V = Actual measurement data at the time of 5-2 downshift at about 65 mile/h

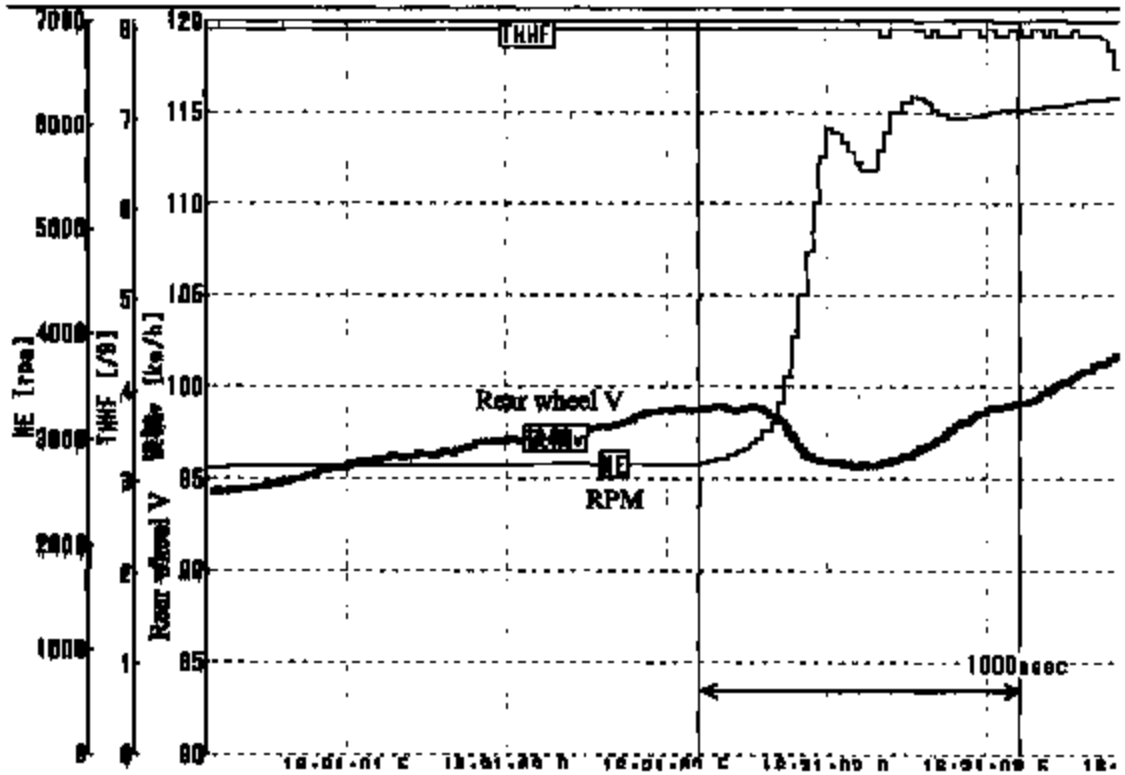
On cruise



Change of the vehicle speed : Representative data sample ③

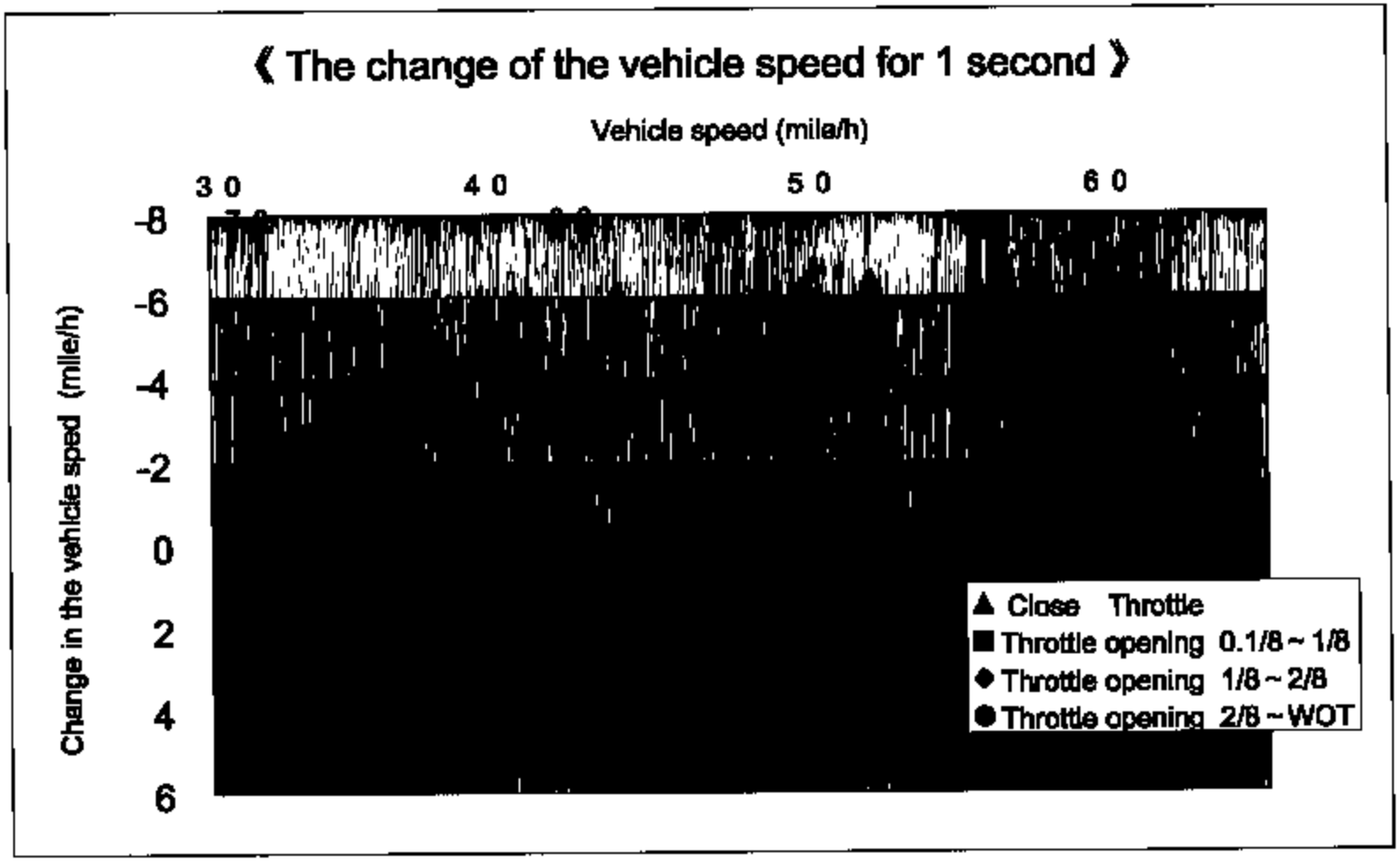
Vehicle V = Actual measurement data at the time of 5-2 downshift at about 65 mile/h

WOT acceleration



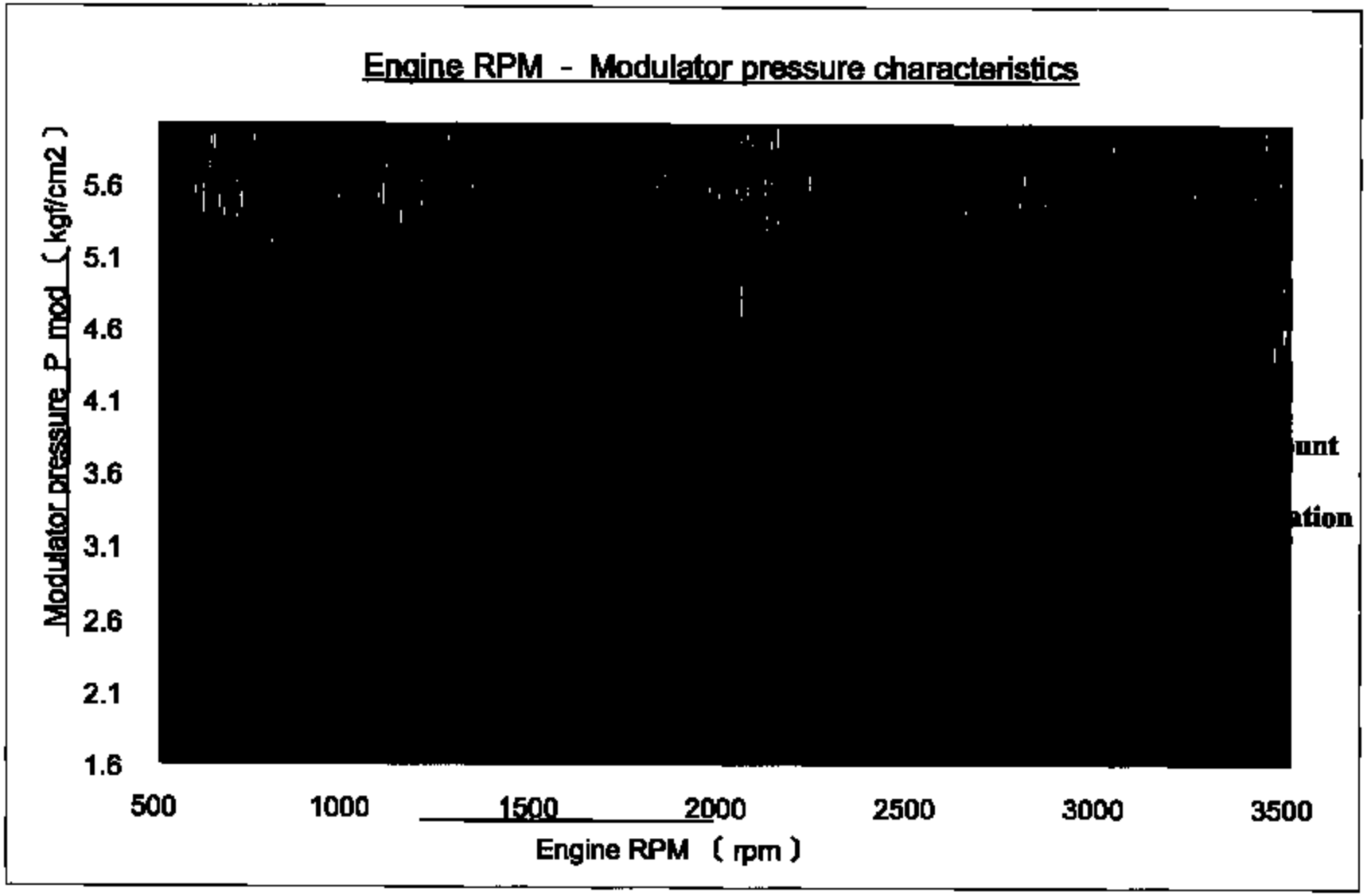
5→2 downshift Change in the vehicle speed

- **The velocity of the vehicle does not change greatly when 5→ 2 downshift occurs.**



The relationship between the Engine RPM and the modulator pressure

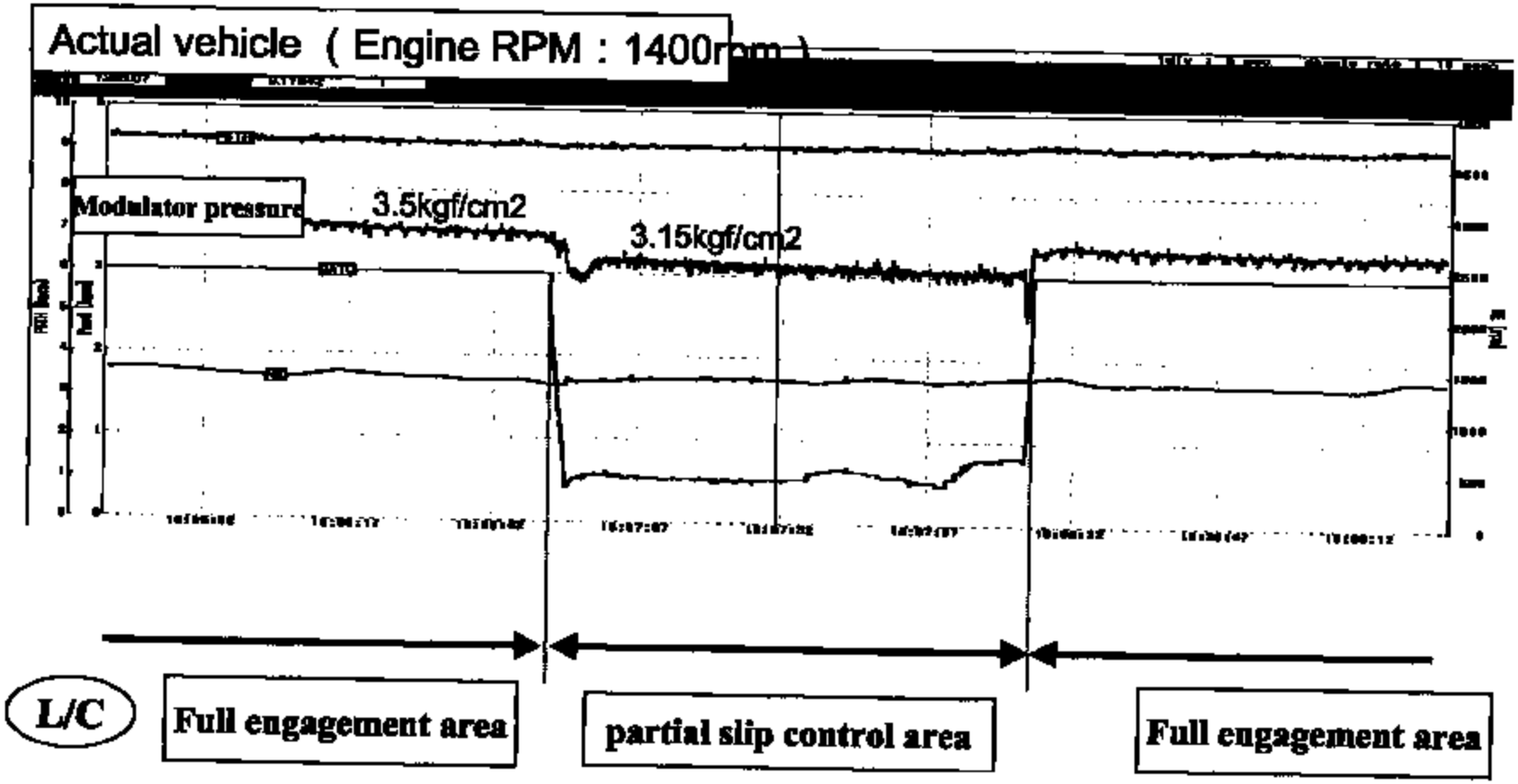
- **The lower the engine RPM is, the further the modulator pressure lowers.**
  - **It is assumed that the symptom occurs frequently at a low vehicle speed.**



The relationship between the L/C area and the modulator pressu

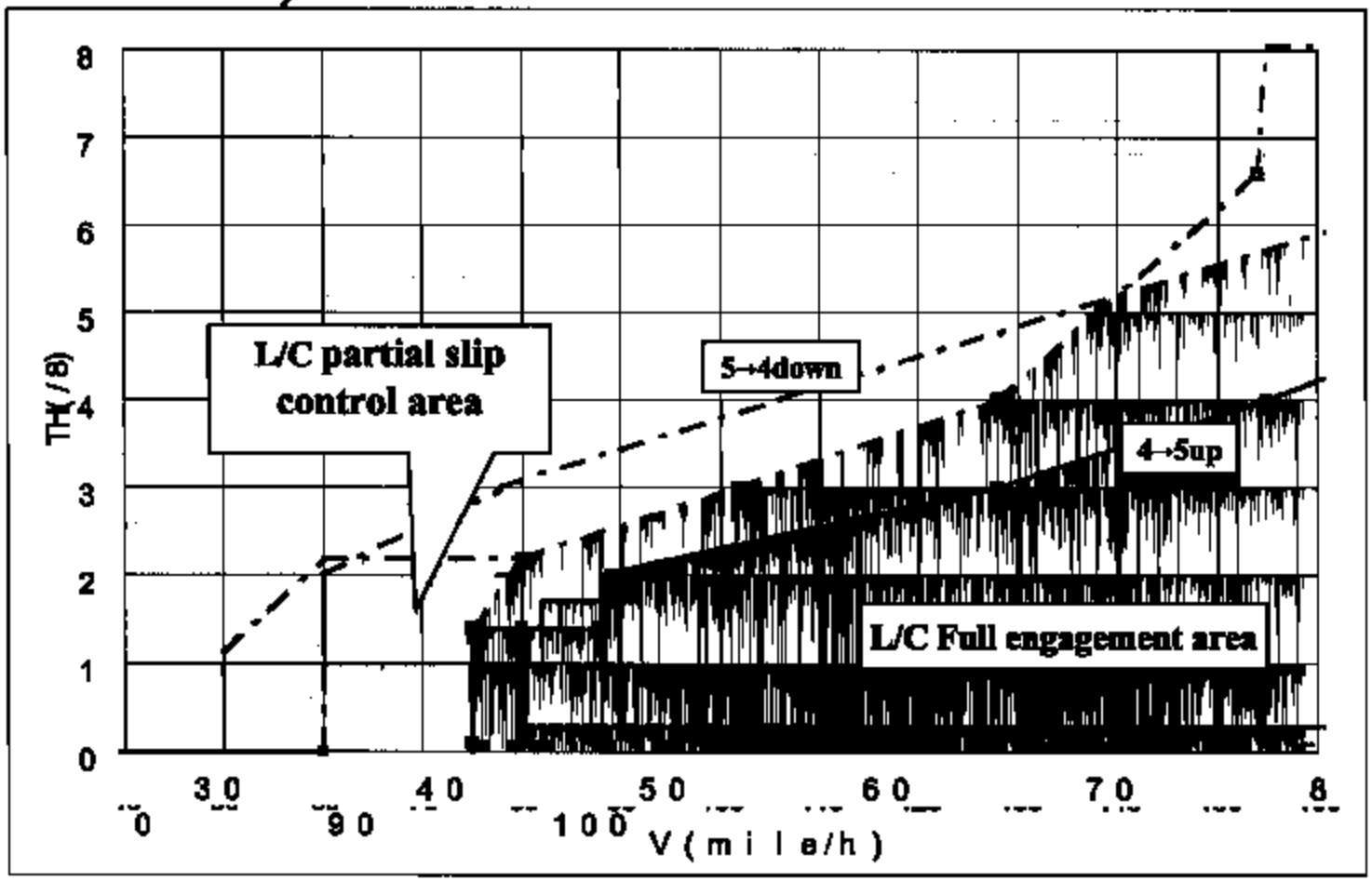
L/C : Torque Converter Lock-up Clutch

- **The modulator pressure lowers in the L/C partial slip control area (low vehicle speed area)**



5→2 downshift Relationship with the L/C area

- **It is assumed that there are relatively many occurrences in the L/C partial slip control area with a lowered modulator pressure (37 ~ 47mile/h)**



Engine RPM **Low RPM** ⟷ **High RPM**

5→2 down-shift Vehicle stability verification result

- Straight course

V(mile/ h)	50	60	70	80	90	100
DRY	◎	◎	◎	◎	◎	◎
WET	◎	◎	◎	◎	◎	◎

- Cornering (PG circuit low speed lane : R280)

V(mile/ h)	50	60	70	80	90	100
G	0.18	0.26	0.35	0.46	0.58	0.72
DRY	◎	◎	◎	◎ ~ ○	○	○
WET	◎	◎	○	○	○	-

◎ : A momentary deceleration occurs, however, there is no change in the vehicle behavior.

○ : A slight understeer occurs due to a momentary deceleration, however, there is no yaw change.

The vehicle behavior returns to the original state (on locus) in the end.

NHTSA Hotline - Transmission Lock-Up Complaint Analysis

Summary of the results:

1. 6 of 9 "Hotline Transmissions" have been tested by HTM/ HONDA R&D, 6 of them have been disassembled & inspected.
   - **ONLY 1 OF THESE HAD DUPLICATION of SELF DOWNSHIFT** by in-vehicle confirmation testing.
   - We disassembled 6 transmissions and inspected their parts, all had clutch wear as the cause of the complaint
   - **NO GEAR or SHAFT or CLUTCH LOCK-UP OCCURRED**, all parts could rotate freely.

No	Model	Year	ATM#	Claim Date	Mileage	Techline Complaint
1	3.2 CL Sport	2001	BGEA1018818	8/16/2002	31742	Shifts Hard Take Off / Will Not Shift from 2nd to 3rd Just Rev
2	3.2 CL Sport	2001	BGEA1028385	11/21/2001	27239	Vehicle Won't Move
3	3.2 CL Sport	2001	BGEA1018720	7/17/2002	37085	Won't Shift
4	3.2 TL Premium	2001	BZWA8014113	7/8/2002	37452	Hard Shift Jerks
5	3.2 TL Premium	2001	BZWA8025514	7/9/2002	26206	Slip 2-3
6	3.2 TL Sport	2002	BZWA9059518	8/9/2002	20625	Will Not Downshift , Slips in All Gears
7	3.2 TL Premium	2000	MZWA1038579	9/11/2002	86202	Trans Down Shifts and Neutrals Out
8	3.2 TL Sport	2003	BZWA5009644	7/29/2002	3915	Car Was Going 55 Then Sudden Downshift Then Stuck in 4th
9	3.2 TL Sport	2002	BZWA9045810	8/28/2002	24767	Bangs 1-2, 2-3

This unit had formal complaint for Sudden Downshift.

9 "Hotline Transmissions" - Analysis Summary

No.	Model	Year	ATM#	Claim Date	Mileage	Analysis Stautus	In-Vehicle Result	Disassembly Result
1	3.2 CL Sport	2001	BGFA1018818	8/ 16/ 2002	31742	Done	2nd, 3rd, 4th, 5th Slips	3rd,4th,5th Clutch Burnt Hydraulic Circuits Contaminated
2	3.2 CL Sport	2001	BGFA1028395	11/ 21/ 2001	27239	Already Reman	-	-
3	3.2 CL Sport	2001	BGFA1018720	7/ 17/ 2002	37085	Done	3rd Slips	3rd Clutch Burnt Hydraulic Circuits Contaminated
4	3.2 TL Premium	2001	B7WA8014113	7/ 8/ 2002	37462	Done	2nd & 3rd Slips	3rd,4th,5th Clutch Burnt Hydraulic Circuits Contaminated
5	3.2 TL Premium	2001	B7WA8025514	7/ 9/ 2002	28208	Done	2nd & 3rd Slips	3rd Clutch Burnt Hydraulic Circuits Contaminated
6	3.2 TL Sport	2002	B7WA9059518	8/ 9/ 2002	20625	Done	Duplicated Sud.Downshift	3rd Clutch Burnt Hydraulic Circuits Contaminated
7	3.2 TL Premium	2000	M7WA1036579	9/ 11/ 2002	86202	Done(HGT)	3rd Slips, no 3-4 Upshift	3rd Clutch Burnt Hydraulic Circuits Contaminated
8	3.2 TL Sport	2003	B7WA5008644	7/ 29/ 2002	3915	Not Rec'd	-	-
9	3.2 TL Sport	2002	B7WA9045810	8/ 28/ 2002	24787	Not Rec'd	-	-

NHTSA Hotline - Transmission Lock-Up Complaint Analysis

Conclusion:

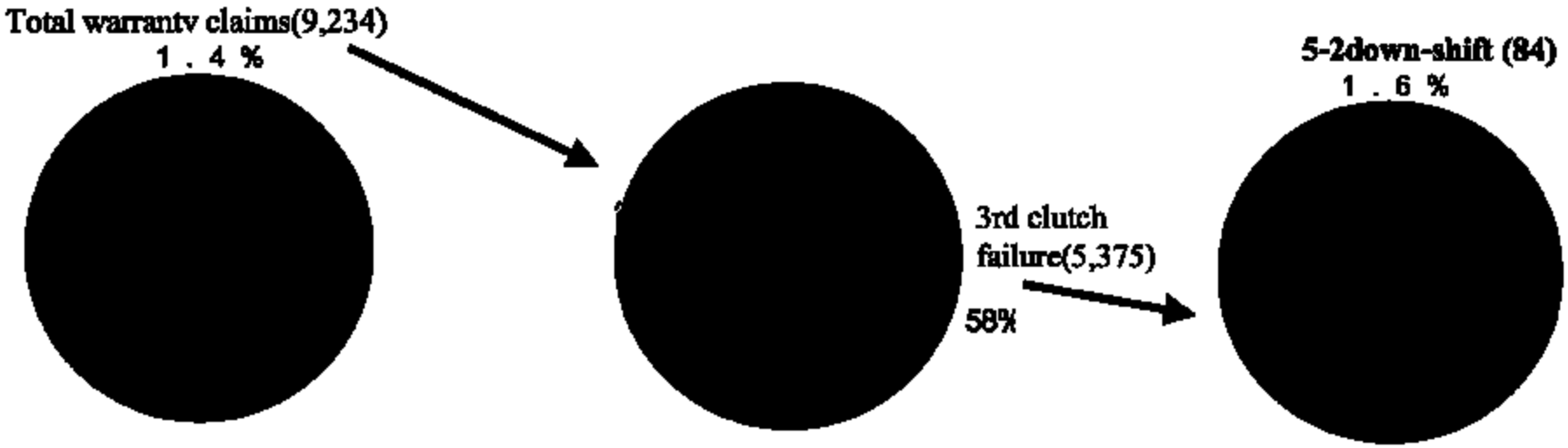
From 58 transmissions dis-assembled & analyzed by HTM Market Quality (that had 3rd Clutch Burning):

- **NO ACTUAL CLUTCH / GEAR / SHAFT LOCK-UPS** were found.

- **NO SEIZURES OF SHAFTS & GEARS** were found.

- **ALL PARTS COULD ROTATE FREELY.**

Occurrence ratio



Total sales 681,103

Total warranty claims
9,234

3rd clutch failure
5,375

5-2down-shift occurrence ratio=84/681,103=0.01%

Counter Measure

- Following 2 countermeasures were applied to production line.
  1. Improvement of surface roughness of 3rd gear clutch plate. APR/2002
  2. Improvement of ECU data (improvement of hydraulic pressure characteristic) MAY/2002

- These 2 countermeasures are being applied to after-service.
  1. Improvement of surface roughness of clutch plate. APR/24/2002
  2. Improvement of ECU data (improvement of hydraulic pressure characteristic) scheduled in early Dec.

- Honda decided to extend the warranty period to 7 years/100k mile and sent a notification letter to the customers .

TL/CL 3rd Clutch Wear

November 7, 2002 T2/T3

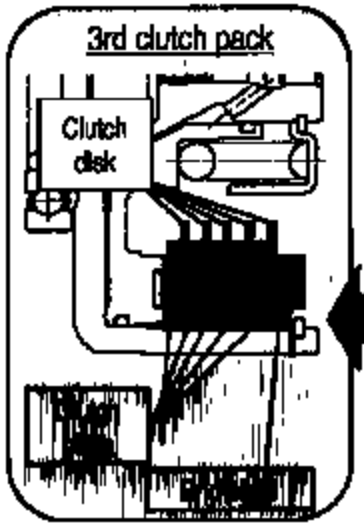
3rd Clutch Wear

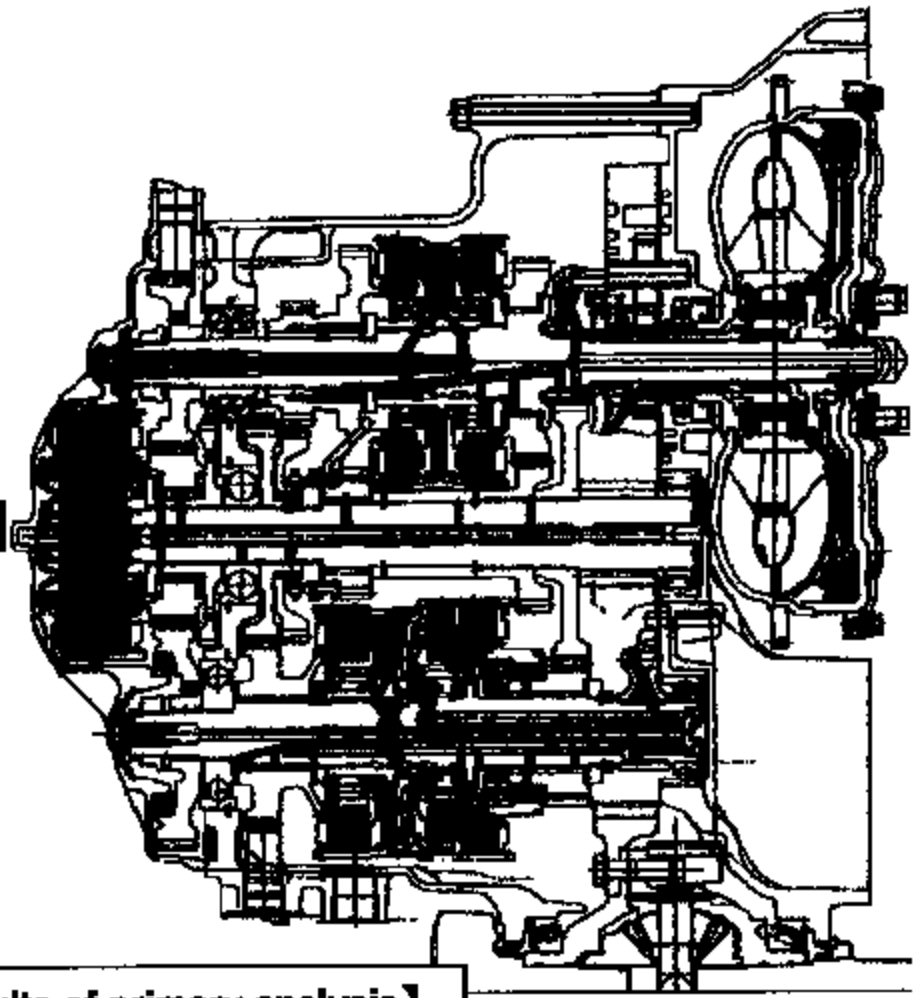
Symptom

Occurred on 00~02M 3.2TL/CL

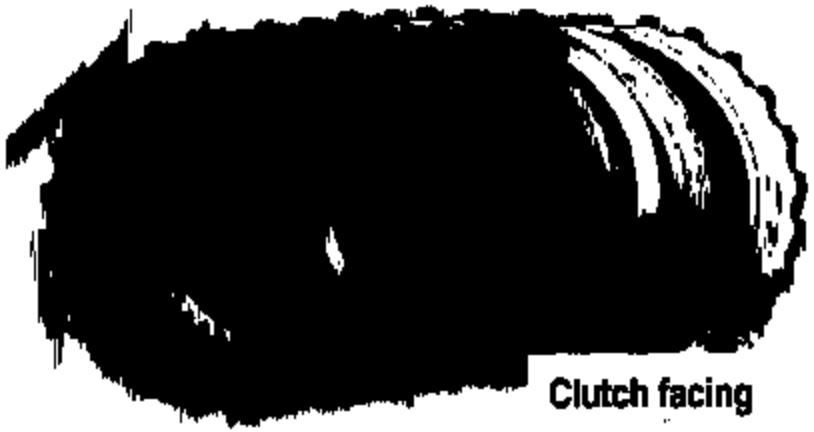
Customers' allegations

Engine flares up on 2-3 upshift
Clutch judders on 2-3 upshift
Transmission has no 3rd gear
etc.





Analysis of symptom-developed product (3rd clutch)



Clutch facing

【Results of primary analysis】
3rd clutch was found burned and excessively worn.

In-depth analysis of 3rd clutch

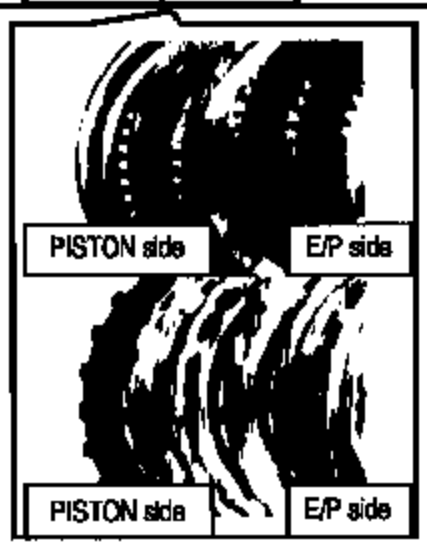
Results of Analysis of Transmissions Returned from the Market

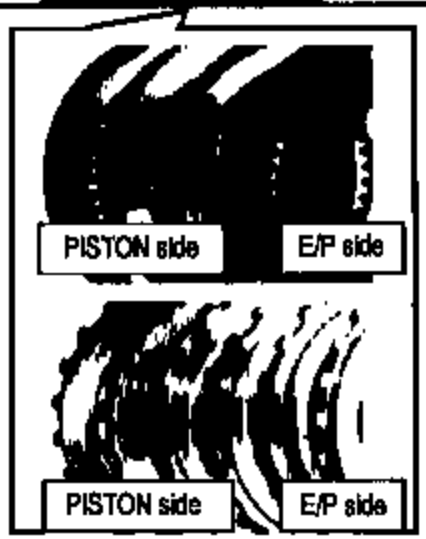
1. Appearance check results

		US build								JPN build			
Miss. No.		B7WA-8031226		B7WA-9044757		B7WA-9027013		B7WA-504222		M7WA-1033139		M7WA-1038579	
Date of manufacture		?		2001/9/4		2001/6/12		2002/2/18		?		2000/3/7	
Date of occurrence		?		2002/8/27		2002/7/10		2002/8/8		?		2002/9/11	
Alleged symptom		5-2 DOWN		SLIPS		NOT SHIFTING		SLIPS		?		HARD SHIFTS	
Mileage		49056 MIL		8035 MIL		20315 MIL		15683 MIL		46419 MIL		86202 MIL	
Burn level	3rd	Facing (completely) worn out		Facing worn out		Facing worn out		Facing (partially) worn out		Facing (partially) worn out		Facing (completely) worn out	
3rd clutch disk wear amount	IN/OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
	1	0.722	0.731	0.681	0.634	0.746	0.734	0.726	0.711	0.605	0.567	0.733	0.728
	2	0.727	0.725	0.682	0.69	0.736	0.72	0.508	0.386	0.679	0.671	0.726	0.718
	3	0.728	0.711	0.669	0.677	0.729	0.72	0.533	0.639	0.612	0.649	0.711	0.706
	4	0.369	0.451	0.466	0.492	0.519	0.56	0.638	0.643	0.143	0.149	0.497	0.533
	5	0.181	0.198	0.143	0.182	0.095	0.123	0.099	0.16	0.126	0.17	0.148	0.17
	Max	0.728	0.731	0.682	0.69	0.746	0.734	0.726	0.711	0.679	0.671	0.733	0.728

Condition of clutch disks

Condition of clutch plates

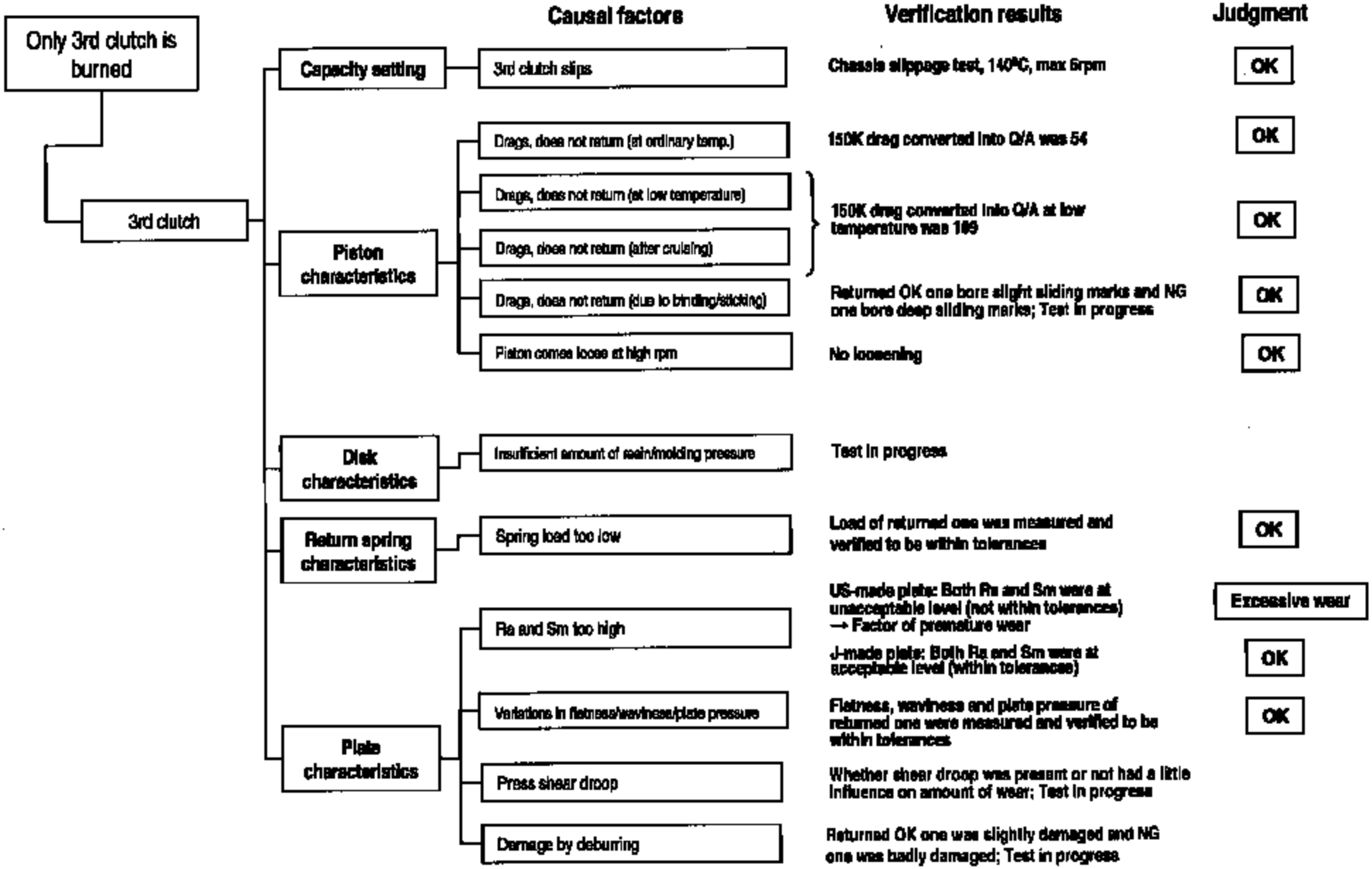




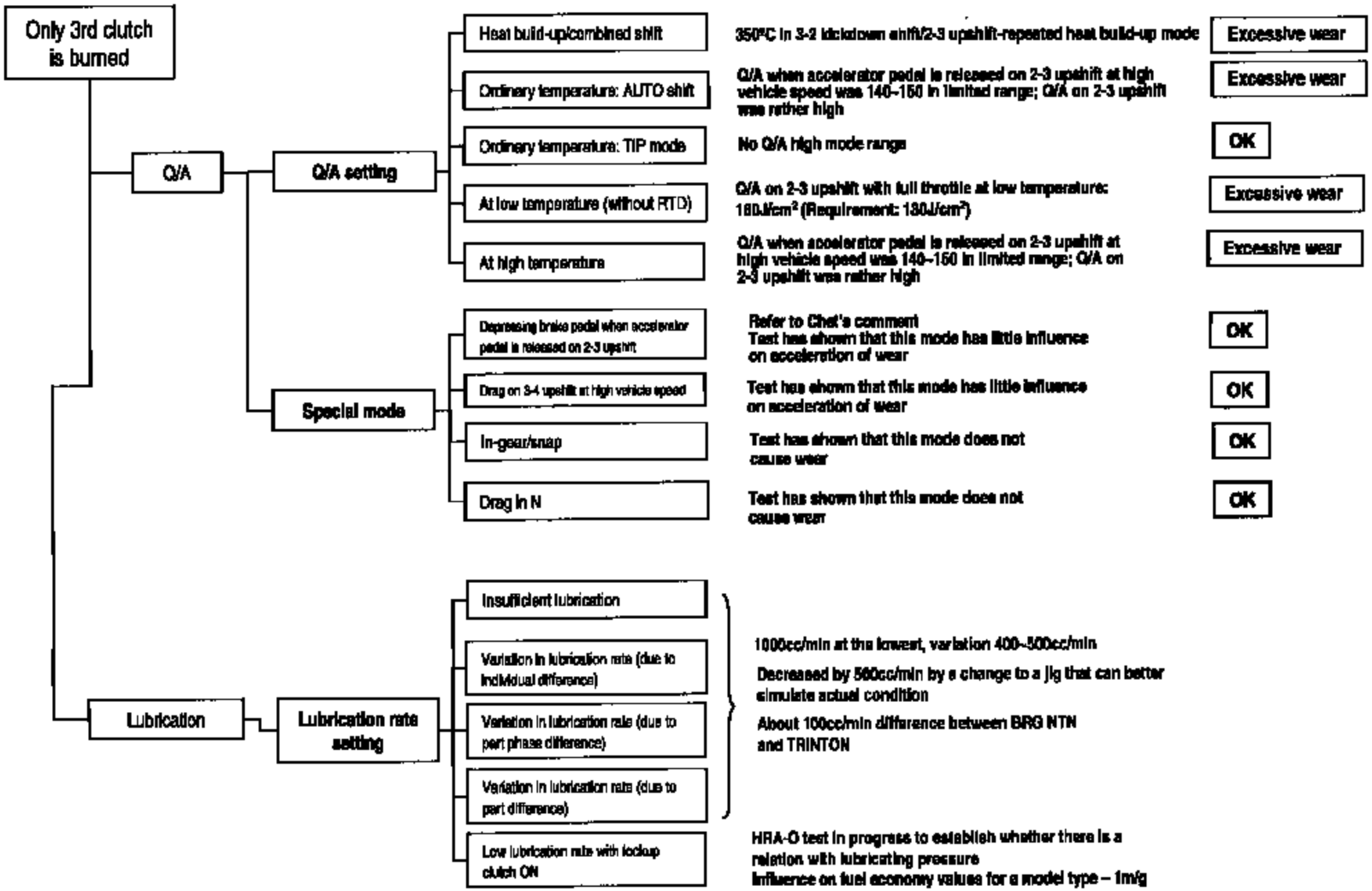
- The clutch disk does not seem to have worn due to heat build-up and resultant carbonization but seems to have worn as if it were filed away.
- Clutches other than 3rd clutch present no unusual wear or burn.
- There is such a tendency that the nearer the clutch disk is to the piston, the larger the amount of disk wear becomes.

Results of Analysis

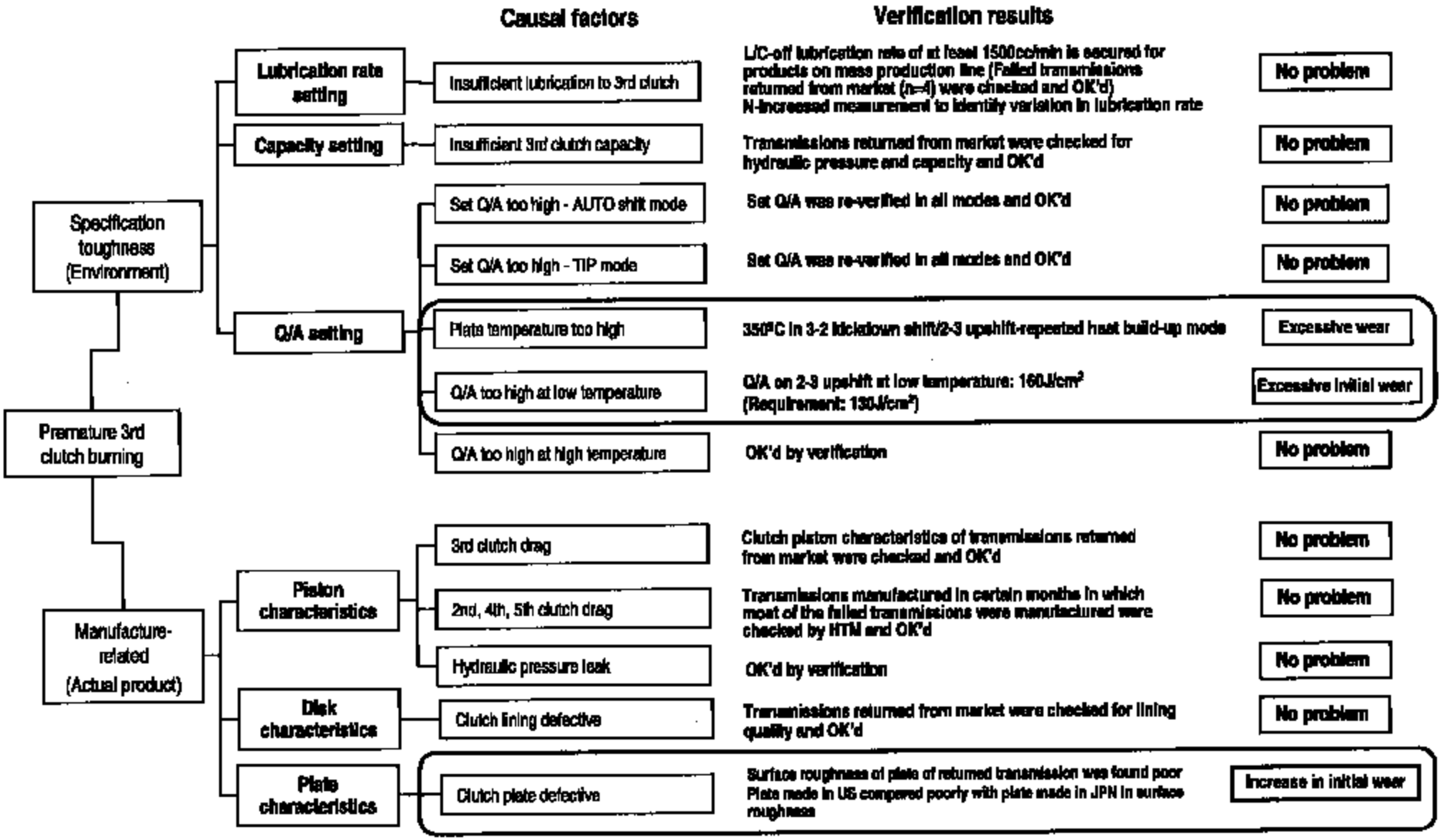
Analysis of Causal Factors of 3rd Clutch Wear and Results of Analysis



Analysis of Causal Factors of 3rd Clutch Wear and Results of Analysis



Analysis of Causal Factors of 3rd Clutch Wear — Results of Analysis as of the End of September

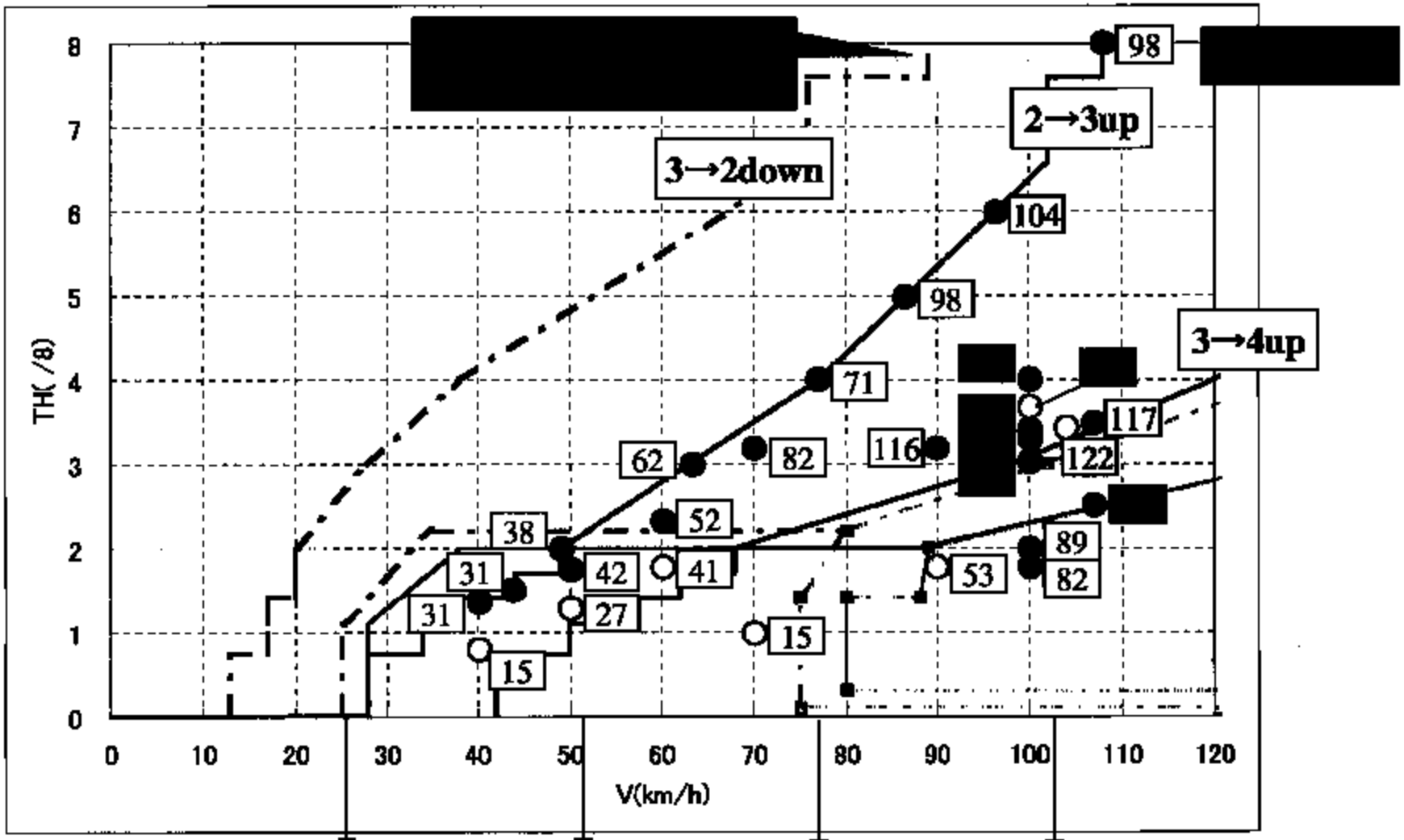


- **Factors causing 3rd clutch burning were narrowed down to two factors; ① surface roughness of clutch plate and ② Q/A while shifting.**

Q/A Setting Analysis Results

Q/A – Lubrication Rate Map

- CO-S, KA version, D range (Pre-improvement ECU)

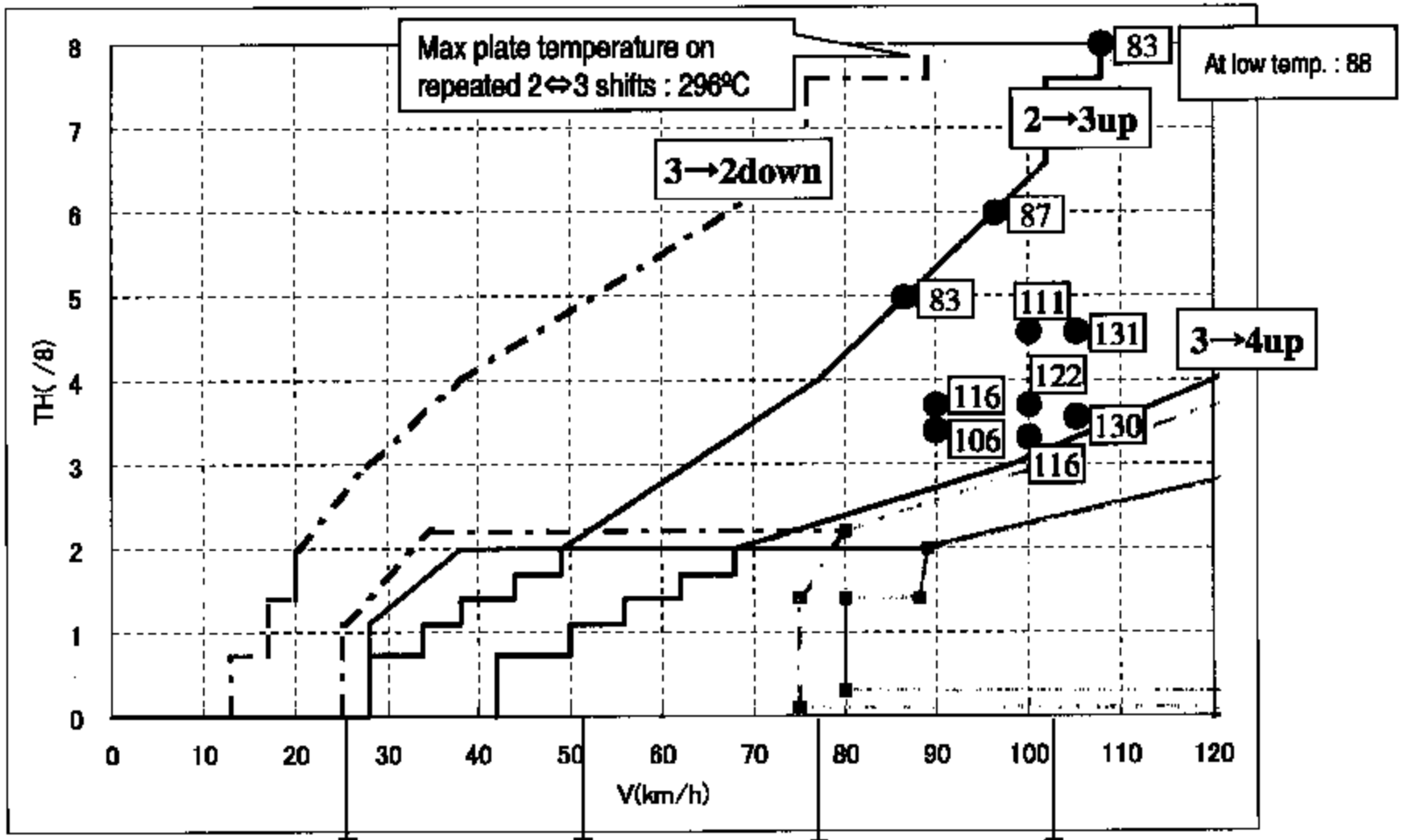


L/C OFF	105cc	680cc	1320cc	1245cc
L/C ON	18cc	400cc	668cc	773cc

● 2-3 upshift
○ 2-3-4 upshift

Q/A – Lubrication Rate Map

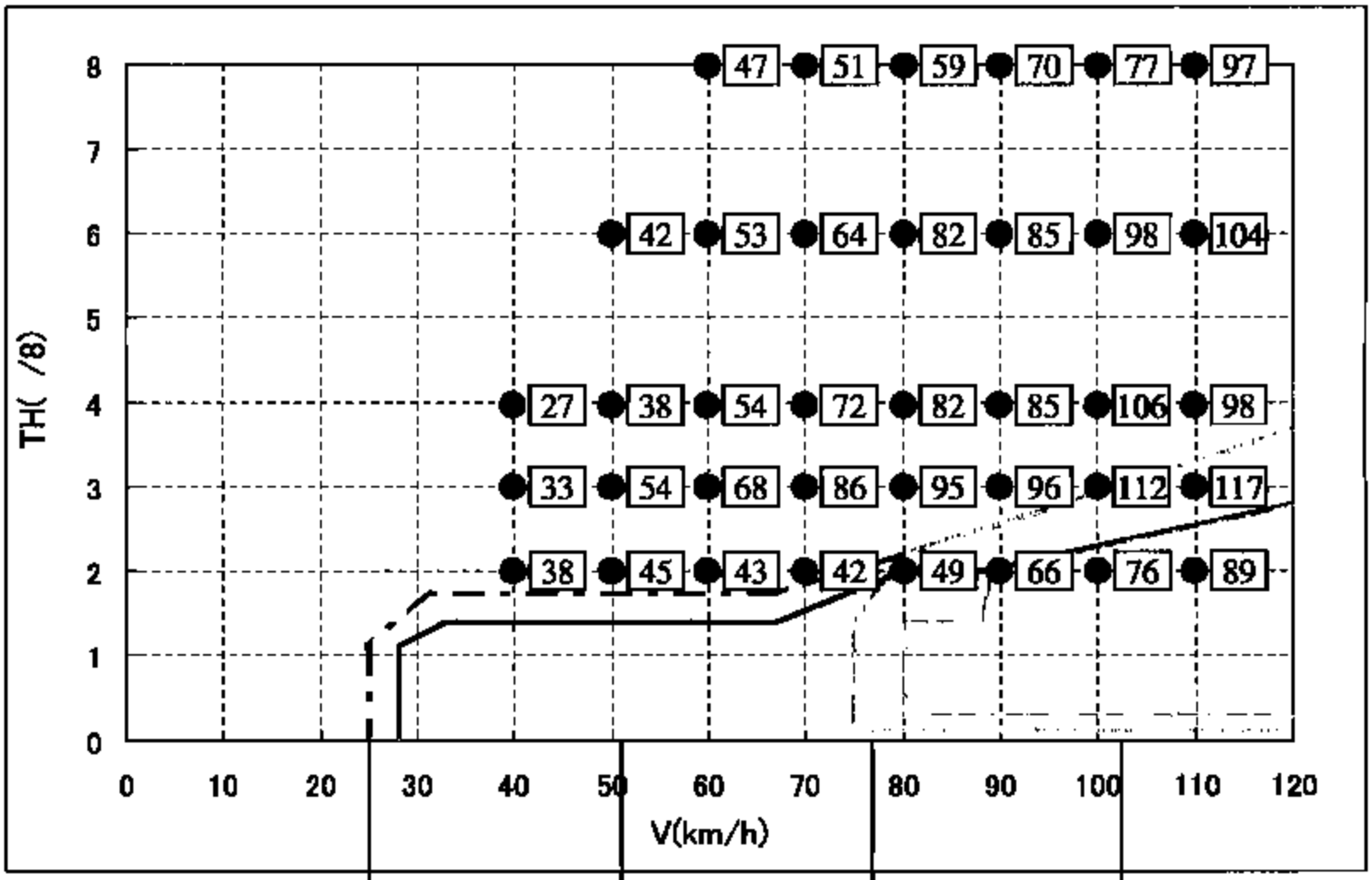
- CO-S, KA version, D range (Post-improvement ECU)



L/C OFF	105cc	680cc	1320cc	1245cc
L/C ON	18cc	400cc	668cc	773cc

Q/A – Lubrication Rate Map

- CO-S, KA version, S-MATIC range



L/C OFF	105cc	680cc	1320cc	1245cc
L/C ON	18cc	400cc	668cc	773cc

3[redacted] Clutch Wear – Summary (EC[redacted] Data) as of the End of Septe[redacted]er

【Basic factor】 ECU data setting lacked propriety

- Q/A on 2-3 upshift at low temperature exceeds the requirement (160J/cm², whereas the requirement is 130J/cm²)
- Heat builds up due to frequent shifting between 2nd and 3rd (360°C, whereas allowable limit is 300°C)

Countermeasures

- Countermeasure to decrease Q/A on 2-3 upshift at low temperature :

  Change in hydraulic pressure characteristics, linear solenoid compensation at low ATF temperature, and shift schedule

- Countermeasure to decrease Q/A on repeated 2-3 upshift/3-2 kickdown shift :

  Change in hydraulic pressure characteristics on 2-3 upshift, increase in engine retard and change of shifting time

Verification of effectiveness of countermeasures

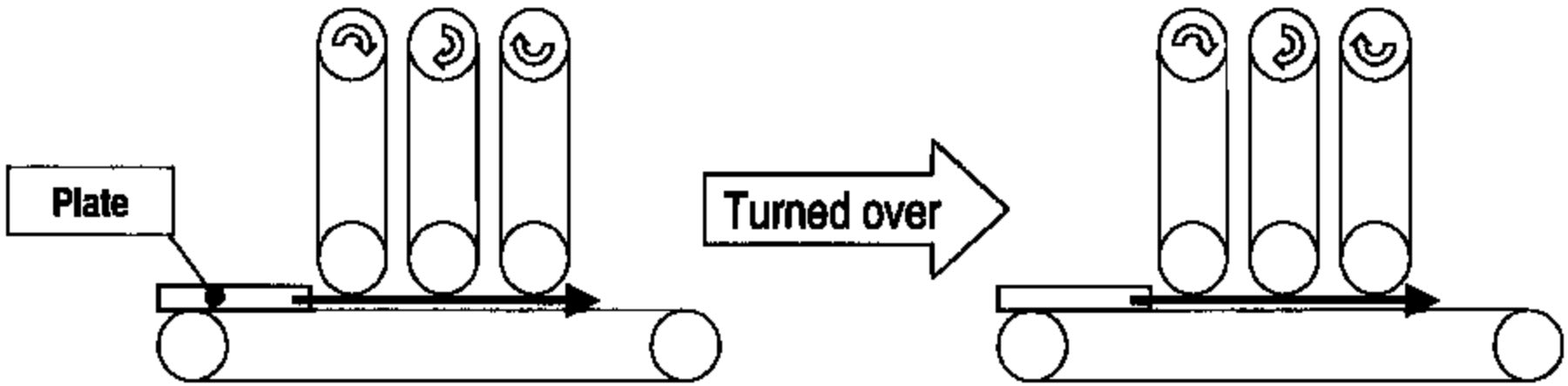
Comparison of clutch Q/A (J/cm²)	CL Before C/M	CL After C/M	Requirement
Upshift (2-3) at low temperature	160	88	130 MAX
Upshift (2-3) at ordinary temperature	98	83	↑
Kickdown shift (3-2)	28	27	85 MAX
Maximum plate temperature after repeated 2-3 upshift/3-2 kickdown shift	360°C	296°C	Target 300°C MAX

- ECU data change (review of hydraulic pressure, shift schedule, etc.) Applied in May

Surface Roughness Analysis Results

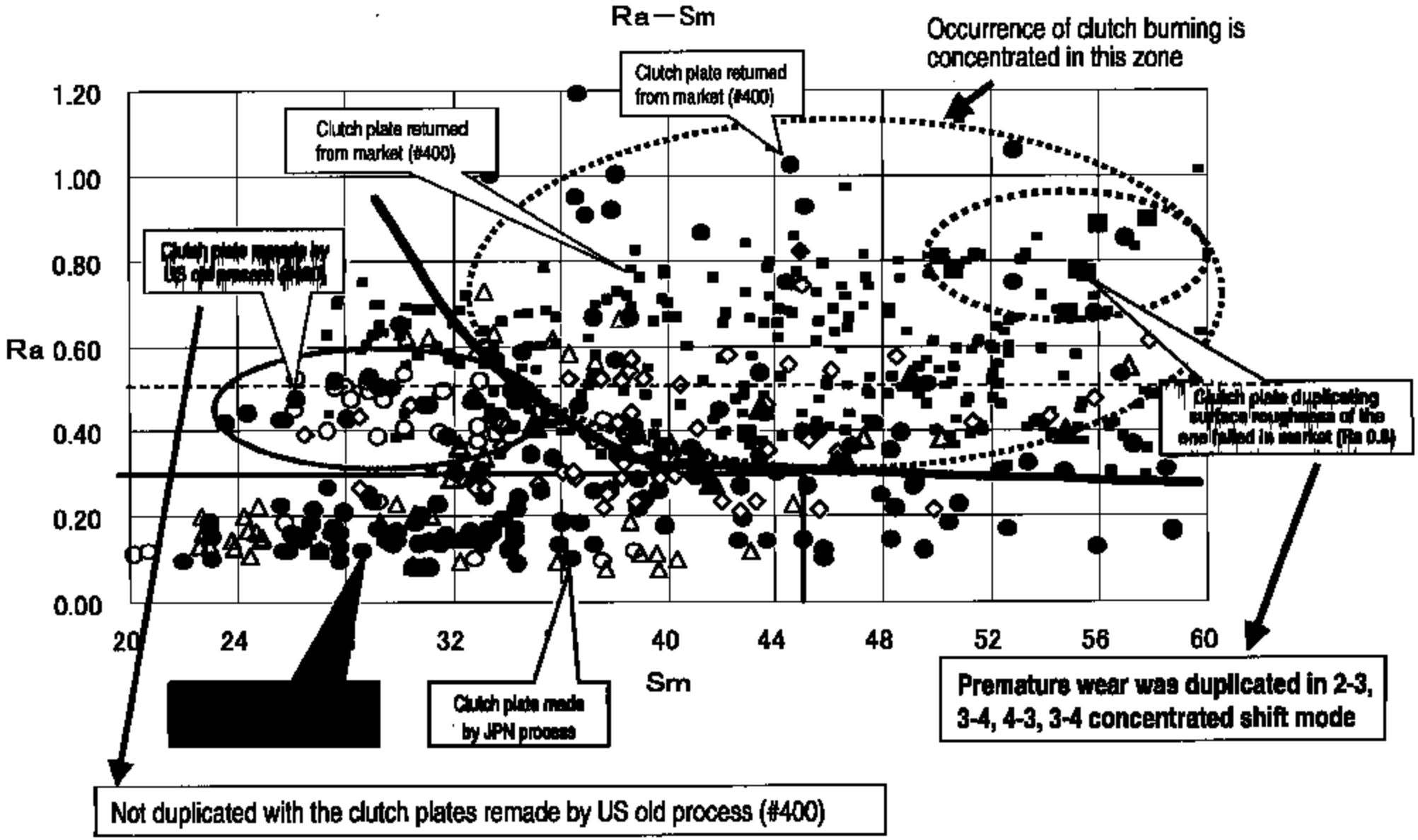
Difference in clutch plate manufacturing process

US old process	**Sanding line (Both-side finishing (lapping) process : Surface grinding machine with 3 wheel heads × 2 machines) Sand #400 / Sand #400 / Cork #400**
JPN process	**Sanding line (Both-side finishing (lapping) process : Surface grinding machine with 3 wheel heads × 2 machines) Cork #600 / Cork #600 / Used Cork #600**
US new process (March 2000~)	**Sanding line (Both-side finishing (lapping) process : Surface grinding machine with 3 wheel heads × 2 machines) Changed to Sand #600 / Cork #600 / Used Cork #600**



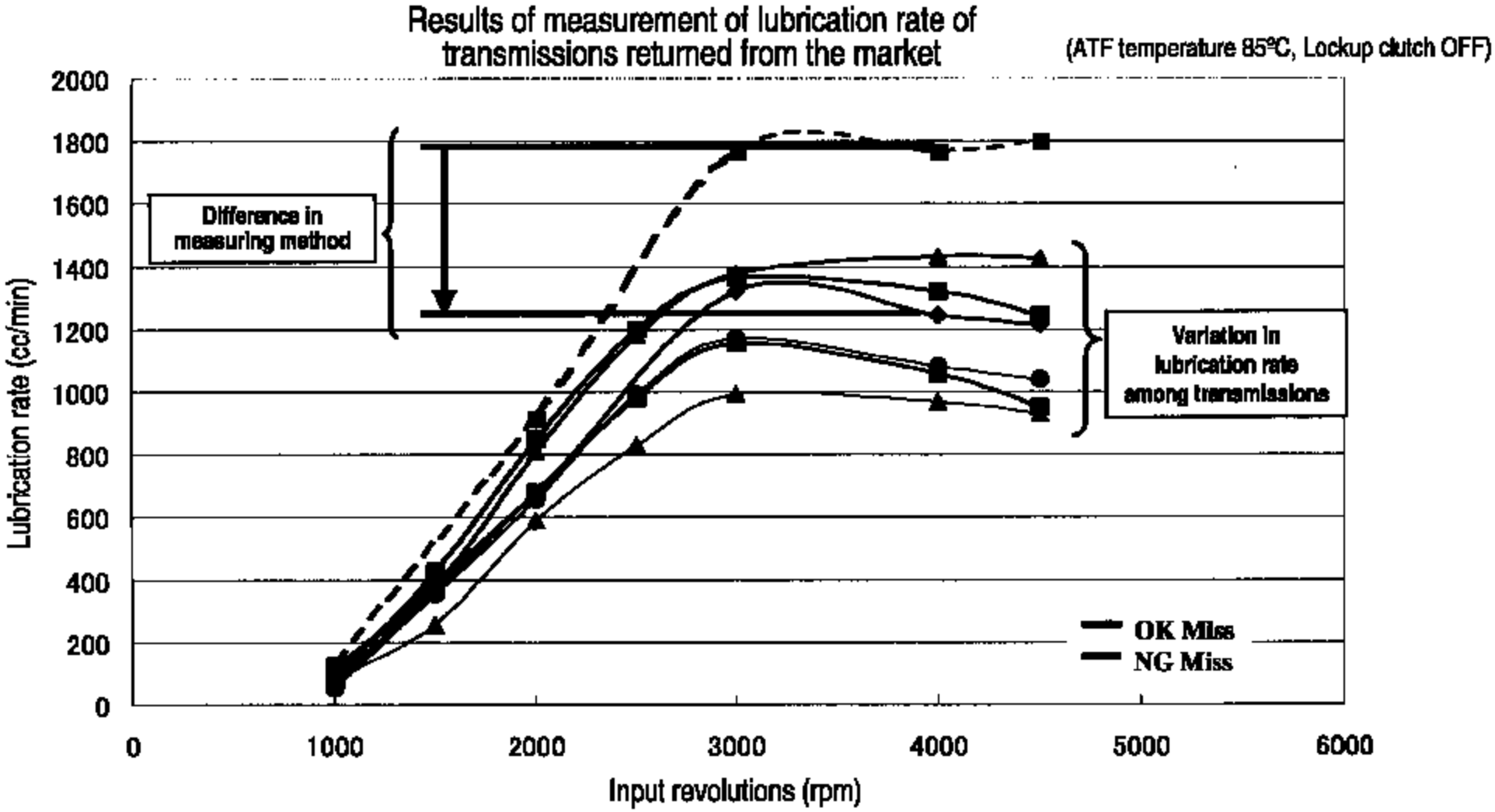
3rd Clutch Wear – Summary of Surface Roughness Data as of the End of September

【Causal factor of sharp increase】 Worsening of clutch plate surface roughness level



Lubrication Rate Analysis Results

Lubrication Rate of Transmissions Returned from the Market

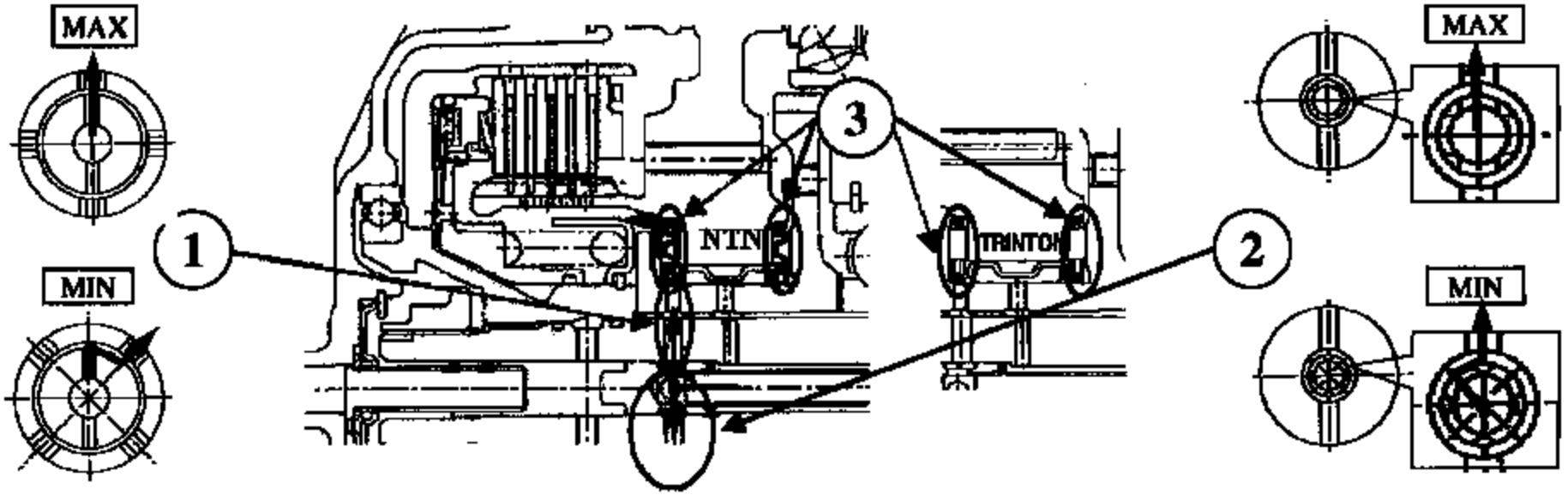


- Variation in lubrication rate among transmissions was about 475cc/min at 4000rpm.
- There was no difference in change in lubrication rate attendant upon change in rpm between the clutch wear OK transmissions and clutch wear NG transmissions returned from the market.
- When the accuracy of lubrication rate measurement was improved (by making a change to a jig that can better simulate the actual condition), the absolute value of lubrication rate was decreased by 530cc/min (at 4000rpm).

Analysis of Causal Factors of Variation in Lubrication Rate

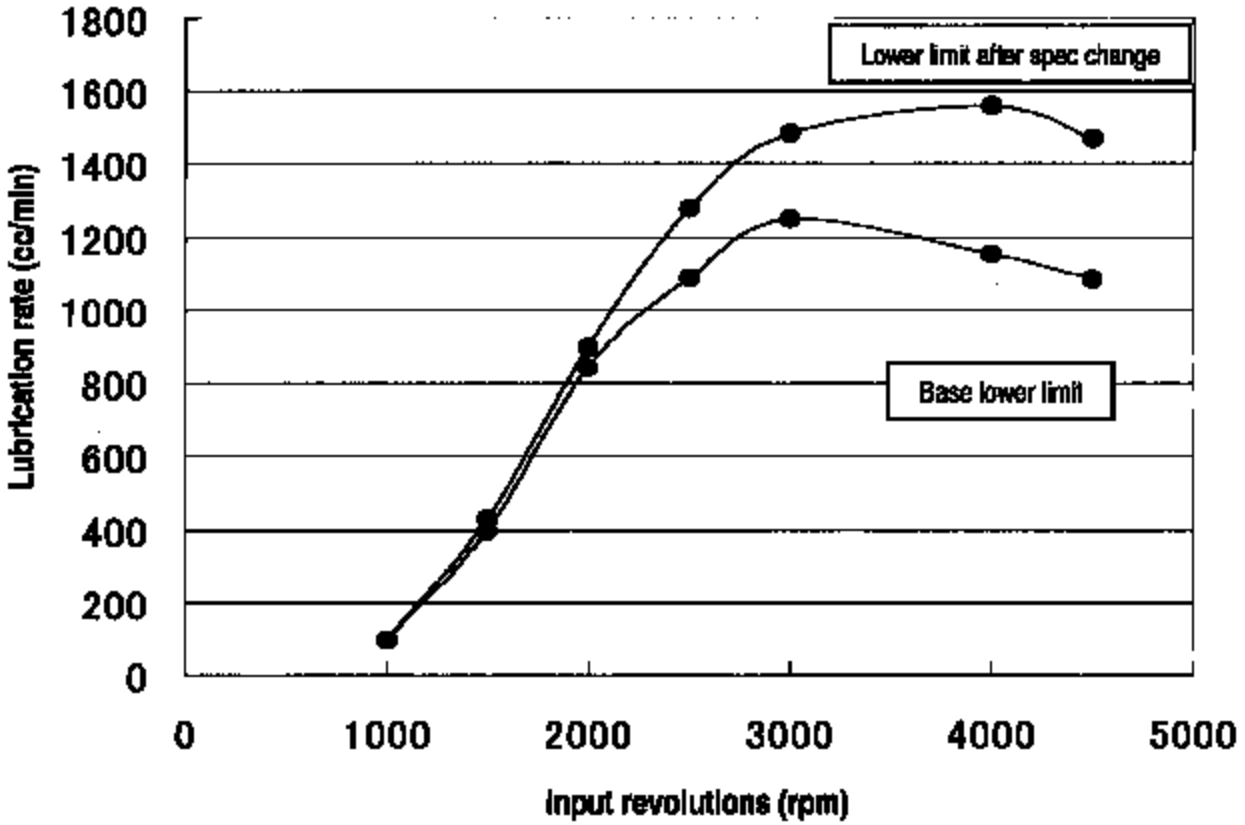
No.	Tested transmission	Causal factors of variation		Lubrication rate (cc/min)	
		Causal factor	Specification	4000rpm	Variance
1	B7WA-8031226	Phase difference between washer groove and C/S oil hole	MAX	1395	210
			MIN	1185	
2	M7WA-1010482	Phase difference between plug oil hole and C/S oil hole	MAX	1365	45
			MIN	1320	
3	M7WA-1027912	Difference in manufacture of C3 thrust bearing	Made by TRINTON	1058	157
			Made by NTN	1215	

Lockup clutch : OFF
ATF temperature : 85°C

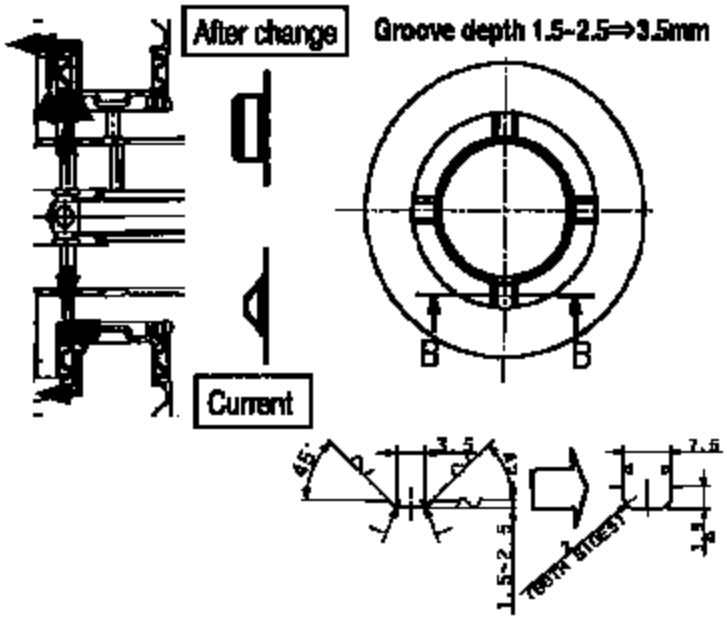


- **Lubrication rate varies by about 210~250cc/min (at 4000rpm) according to assembly phase.**
- **Lubrication rate varies by about 160cc/min (at 4000rpm) according to bearing specification. (Bearing of NTN make compares advantageously with bearing of TRINTON make in lubrication rate. At present, only the bearing of NTN make is used.)**

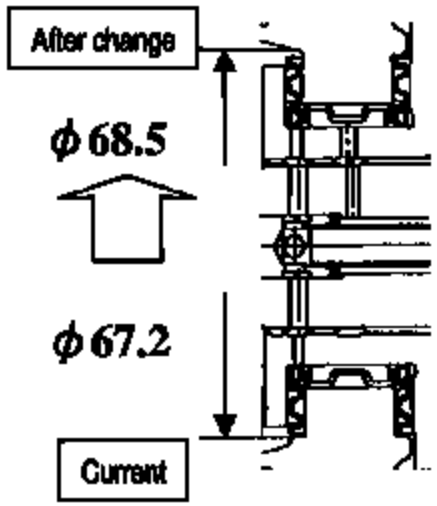
Specification Change for Better Lubrication



● C-3 washer oil groove depth is increased



● C-3 gear needle pocket inside diameter is increased



Confirmation of effect of specification change

By increasing the depth of oil groove in washer and the inside diameter of C-3 gear needle pocket,

- **The lower limit of lubrication rate was raised by about 410cc/min at 4000rpm.**
- **After it is proved by N-increased check that the specification change is wholly effective and that there is no negative aspect, the specification change is applied in mass production for the purpose of reducing variation in lubrication rate and raising the lower limit of lubrication rate. (Drawing issue will be on November 15)**

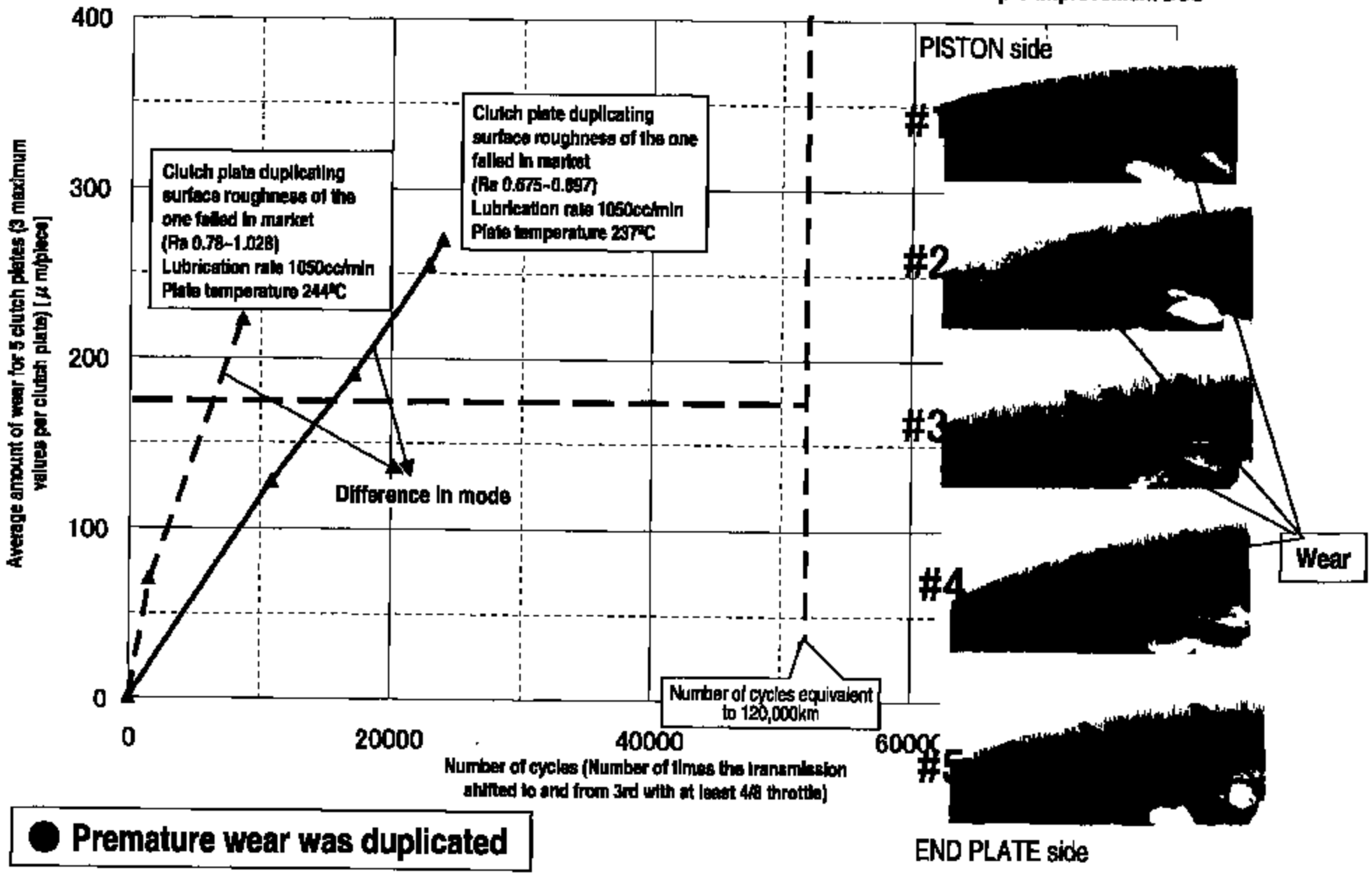
Duplication Test Results

Bench Duplication Test Results

2-3, 3-4, 4-3, 3-4 Concentrated Shift Mode

Clutch wear and number of durability cycles

Test was carried out using pre-improvement ECU



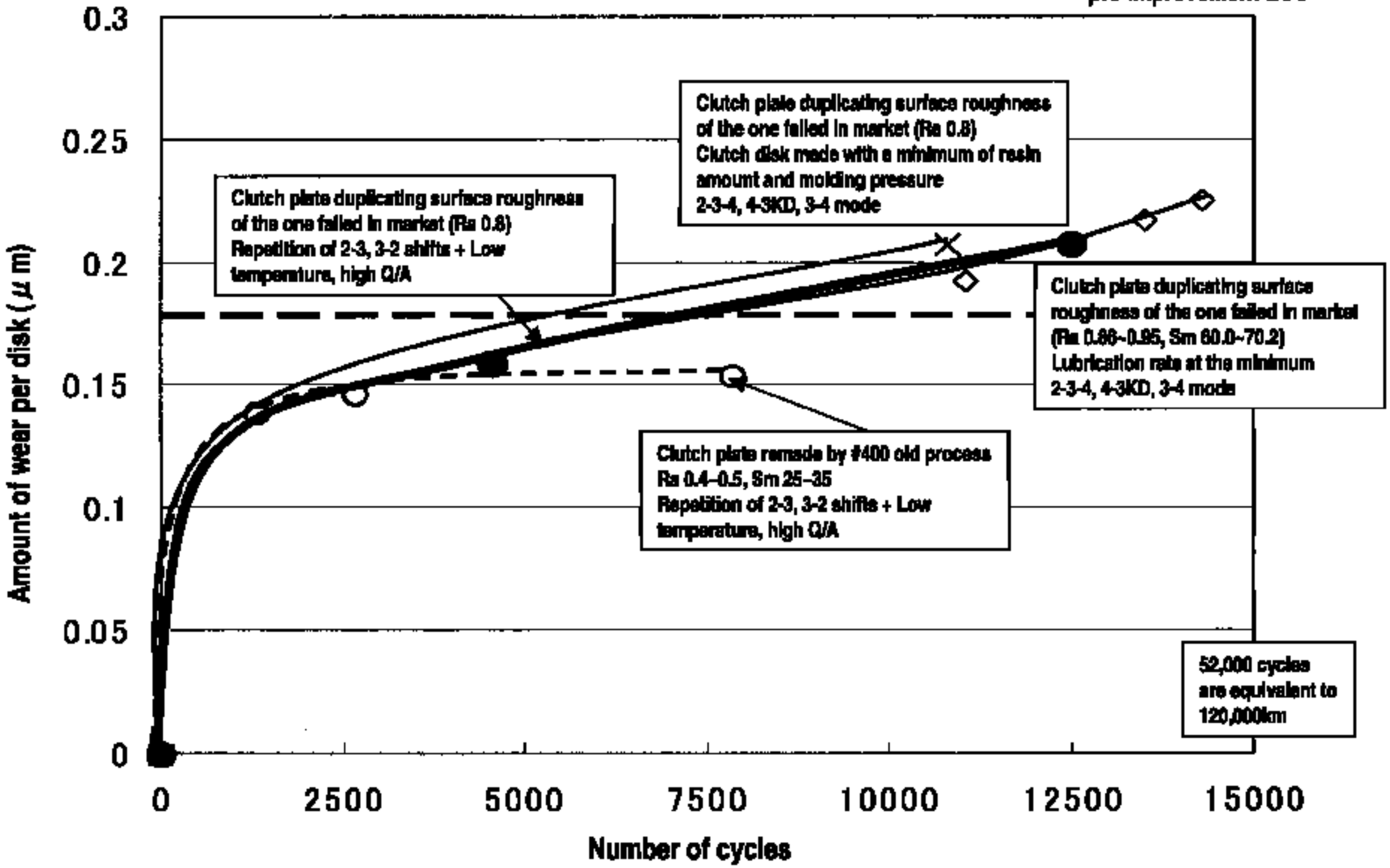
● Premature wear was duplicated

Actual Vehicle Duplication Test Results

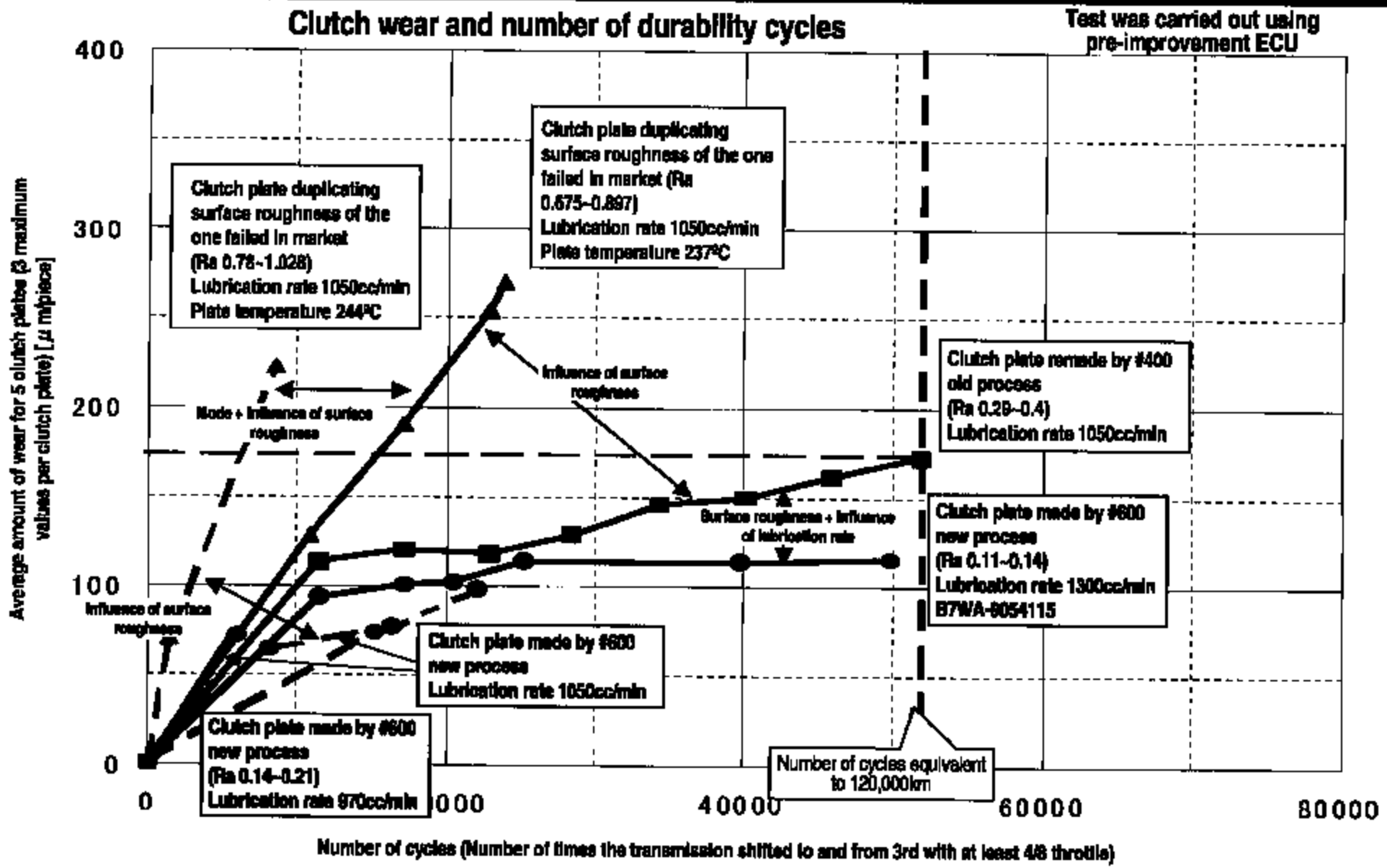
2-3, 3-4, 4-3, 3-4 Concentrated Shift Mode

Clutch wear and number of durability cycles

Test was carried out using pre-Improvement ECU



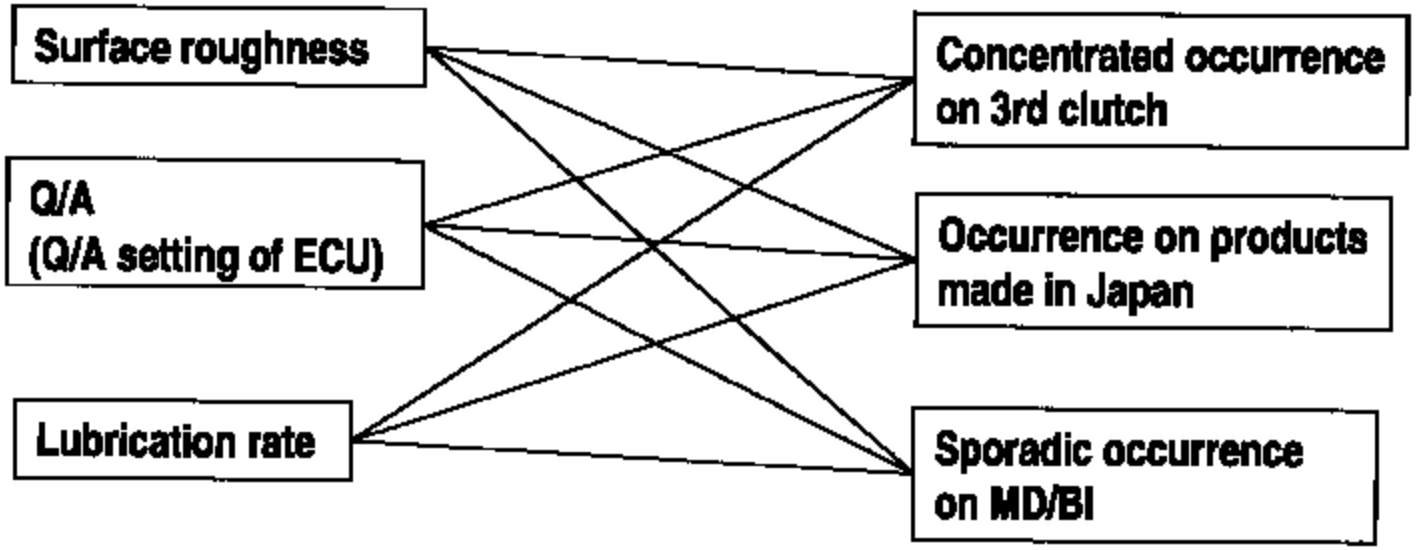
● Premature wear was duplicated



- Surface roughness has a great influence on clutch wear. What influence lubrication rate and ECU have on clutch wear should be clarified.
- The test conducted using clutch plates remade by #400 old process (Ra 0.3~0.4) and the pre-improvement ECU has met with OK result, however, clutch plates and ECU require further verification as to specification lower limit.

Summary

- The test conducted using clutch plates remade by #400 old process (Ra 0.3~0.4) and the pre-improvement ECU has met with OK result, however, clutch plates and ECU require further verification as to specification lower limit. (~ November 15)
- High Q/A (Q/A setting of ECU) is considered to be a fundamental factor in the causation of 3rd clutch wear.
- The major factor lying behind the rapid increase of incidence in products made in US is that the "surface roughness of clutch plate took a turn for the worse."
  Duplication test revealed that the clutch plate surface roughness had a very great influence on clutch wear.
- Specification change is made to reduce variation in lubrication rate and raise the lower limit of lubrication rate. (Drawing issue will be on November 15)
- Regarding the "Q/A" that is a fundamental factor and the "lubrication rate," analysis is continued as to the extent of influence exerted by these factors to identify the factors involved in the occurrence on products made in Japan, sporadic occurrence on MD/BI, and concentrated occurrence on 3rd clutch. (~ End of November)



Attachment Q8

Parts Demand
PE02-061 Attachment Q8

Component Name	Part Number Svc	Honda Code	Application (Model/MY)	1998	1999	2000	2001	2002 (Thru Nov.)	Totals	Jan-01	Feb-01	Mar-
INT PART NUMBERS			(Superseded parts being sold prior to the current part number are shown in the same background color.)									
…ANTY A/T KIT	[illegible]	HC 737[illegible]	2000-2001 TL	0	40	3[illegible]	1,2[illegible]	4,520	6,0[illegible]	46	3[illegible]	
[redacted]												
WARRANTY A/T KIT	06200-P7W-A82RM	HC 7305075	2002-2003 TL	0	0	0	205	2,625	2,830	0	0	
[redacted]												
SUPERSEDED PART NUMBERS (descending order)												
WARRANTY A/T KIT	[illegible] (Superseded to 06200-P7W-840RM in Nov. 2002)	HC 70[illegible]		0	0	0	0	0	0	0	0	
WARRANTY A/T KIT	06200-P7W-[illegible] (Superseded to 06200-P7W-[illegible] in Feb. [illegible])	HC [illegible]17		0	0	8	[illegible]	4,511	5,1[illegible]	0	0	
WARRANTY A/T KIT	[illegible] (Superseded to 06200-P7W-020RM in July [illegible])	HC 6447[illegible]		0	0	127	[illegible]	0	[illegible]	46	3[illegible]	
WARRANTY A/T KIT	[illegible] (Superseded to 06200-P7W-010RM [illegible])	HC 621[illegible]		0	0	174	8	0	182	0	8	
[redacted]												
WARRANTY A/T KIT	06200-P7W-A81RM (Superseded to 06200-P7W-A82RM in Oct. 2002)	HC 7086527		0	0	0	0	981	981	0	0	
WARRANTY A/T KIT	06200-P7W-A80RM (Superseded to 06200-P7W-A81RM in Feb. 2002)	HC 6872919		0	0	0	205	1,647	1,852	0	0	
[redacted]												
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]		[illegible]	0	0	[illegible]	[illegible]	[illegible]	0	0	
[illegible]	[illegible]	[illegible]		0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]		0	0	4	[illegible]	0	4	0	0	
[redacted]												

Monthly Sales Figures for the Past 23 Months

01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02
3	44	44	10	117	137	130	212	283	272	251	309	351	387	328	428	442	531	685	
3	5	7	12	7	21	5	80	115	109	96	107	183	166	176	285	311	373	441	414
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	110	102	193	280	272	251	309	349	365	327	427	442	530	685	554
3	44	36	10	117	27	28	19	3	0	0	0	2	2	1	1	0	1	1	1
0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	120	61	18	142	69	76	206	272
3	5	7	12	7	21	5	80	115	109	96	107	43	107	160	123	222	297	235	142